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Hosiery Dyeing

Fastness Requirements—Yarn Dyeing—Sulphur Black Yarn—Sources of Trouble—Preliminary Treatments —Methods of Dyeing Various Types of Hosiery

By B. L. HATHORNE, B.T.C.

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THREE or four years ago the superintendent of a certain New Hampshire mill presented his dyer with a stocking made of worsted and rayon with the request that he dye it a fancy shade. The dyer, who for twenty-two years had dyed nothing but black, blue and brown, looked at it and remarked, "Guess you had better let the next chap worry about that."

Worry was just what the next chap, indeed the next eight men, did. This year that mill is putting out innumerable styles of stockings, none of which in any way resemble the old black, blue and brown products.

Practically all the hosiery mills that formerly made cheap cotton, and cotton and wool stockings, have either changed to light shades and fancies or have given up the ghost. To-day hosiery dyeing is a difficult and complex proposition.

Fastness

In considering fastness requirements for hosiery the dyer considers three things—fastness to washing, fastness to crocking, and fastness to perspiration. All other fastness properties are of secondary importance in hosiery work.

Of course, a golf stocking must be reasonably fast to light, but when one considers that it is a very good stocking, indeed, that can be worn thirty times, light fastness need not play a very great part in one's figuring.

In goods dyed a solid shade, fastness to washing becomes of secondary importance. But it is quite evident that the goods must be fast to perspiration and rubbing, or the wearer's foot will be stained after a day's wear.

Stripes, checks and other such patterns must be much faster to washing than solid shades. Such stockings are made by plaiting one yarn over another, and it often happens that a white or very light shade is plaited over a full shade dyeing. During finishing the wet goods are pulled over a board or form and allowed to dry rather slowly. Under these conditions the slightest bleeding of yarns will produce a second stocking.

A hosiery dyer is often required to dye raw stock which goes to make a coarse grade of cotton and wool hosiery, but raw stock is raw stock whether dyed in a hosiery mill or elsewhere, and will not be considered here.

Yarn Dyeing

Yarn dyeing occupies a good share of the dyer's time in a mill that makes many sport hose. The dyer finds it necessary to dye cotton, mercerized cotton, wool and many other merino yarns each with a different wool content. Franklin Process yarn dyeing machines are, in the writer's opinion, best adapted for this work.

Many difficulties in yarn dyeing with this machine can be traced back to improperly prepared cones. The yarn must be wound reasonably hard to insure proper "back winding" after dyeing, but should not be wound so hard as to cause difficulty in penetration.

If the yarn on cones or caps delivered to the spring winder is wound hard, a hard spring will surely result, so too tightly wound yarn should not be purchased. If the yarn delivered to the spring winder is too soft it can be made to wind with the desired firmness by applying tension.

The yarn guide on the spring winder must be watched rather closely. If the guide does not move evenly a hard ridge is formed on the spring which will not penetrate during dyeing. Most spotted yarns from the Franklin machine may be traced to this source.

The writer finds it good practice to bring the yarn, whether cotton, wool, or merino, to a boil in an hour (less for some shades) and to feed on the exhausting agent, salt or acid, at the boil during three-quarters of an hour to an hour. The writer has obtained the best results by adhering to this process and choosing dyestuffs to fit it rather than by changing the method of application to fit individual dyestuffs.

Scouring is unnecessary when this method is used, as the goods are completely wet out before any exhausting agent is added. Two to three per cent of soluble oil

added to yarns, other than all wool ones, not only helps one to obtain level dyeing, but what is more important in a hosiery mill, makes the yarns much softer and reduces the number of seconds made during knitting.

Wool yarn will be in much better condition for back winding and knitting if no Glauber salt is used during dyeing.

As it is more difficult for the dye liquor to pass through the goods when going from inside of the spring out than when it is forced from the outside in, it is customary to run the machine a little longer when it pumps from inside out. The writer has obtained good results by running six minutes from inside out, shifting and running four minutes from outside in.

To obtain absolutely level results on medium to light shades one should add small portions of the salt or acid necessary to exhaust the dye bath each time the flow of liquor is reversed. These foods should be so gauged as to exhaust the batch in forty-five minutes to one hour.

Sampling is most satisfactorily done by raising the cover and removing a cone. This allows the cones to be inspected for penetration and levelness, which is of especial importance after a feed on.

The most level dyeing colors obtainable should be used for feeding on purposes if it is necessary to shade up the goods. Even then the feed should be put on in several positions, one portion each time the machine is reversed.

Sulphur Black Yarn

Sulphur Black dyed yarn gives trouble in many plants. The yarn is often dusty, wiry, and easily tenders on storing. The source of the trouble is usually in the washing. If the yarn is given four waters (the fourth one hot), followed by a half-hour run in 1½ per cent of ammonia at 130 deg. Fahr., four waters (the last one hot), followed by a half-hour run in 2½ per cent of soluble oil, and two final rinses, the yarn will be left soft and pliable with no dustiness evident, and may be stored satisfactorily for a reasonable length of time.

Due care in drying cannot be overemphasized. The yarn must be thoroughly dried, which takes about twenty-four hours under proper conditions, but must not be left on the dryer after becoming dry. Yarn left too long in the dryer becomes harsh, wiry, and tender. This causes knitting machines to skip and make many more seconds than is the case when soft yarns are used.

Sources of Trouble in Hosiery Dyeing

A hosiery dyer gets all kinds of work. He gets cotton stockings, mercerized cotton stockings, wool stockings, merino stockings and innumerable combinations of cotton and wool with the various rayons.

Hosiery dyeing, like every other branch of the game, has its own pet troubles and difficulties. The worst of these are due to construction. As the bulk of the wear on a stocking comes on the heel and toe, it is necessary to knit these of a comparatively heavy yarn, usually run in an extra yarn, and always knit very tight. As a result there are two extremes in every stocking: a loosely knit leg made of a soft yarn, and a very tightly knit heel and toe usually made of firmer yarns.

The problem of heel and toe penetration becomes particularly important in styles that are at their best when run only a short time in the dye bath. For instance, a stocking made of a fine denier rayon plated over a relatively coarse worsted makes an excellent stocking when properly dyed, but is unsalable if the worsted felts up a bit and shows on the face. A cotton and rayon stocking is at its best when the cotton and rayon are a solid shade, which is most easily accomplished by running the goods only a short time.

One of the most common troubles encountered is friction marks on the heel and toe. Friction marks are rarely found on the leg and rarely on goods with a soft heel and toe. But stockings with a hard or "boardy" heel and toe, when dyed in the American laundry type of rotary machine, are very apt to develop such marks.

The loose construction of the leg is responsible for certain troubles. There we have ideal conditions for felting in goods which are at their best only when free from felting. The least bit of felting detracts from the feel and look of the goods. And it does not take much felting to change the size of the hose.

Several kinds of yarn are often used in one stocking. For example, the top may be of cotton, the leg of rayon plaited over worsted, and the heel and toe of mercerized cotton. Naturally, under these conditions, it is difficult to get a solid shade.

The feel and the appearance of the finished goods must always be borne in mind by the dyer. For example, one might think a yarn-dyed stocking would feel better than one which is piece-dyed. But such is not the case. The piece-dyed stocking has a softer feel. Stockings which will not hold their shape when yarn-dyed show no tendency to "crawl" when piece-dyed.

Preliminary Treatments

Cotton and wool stockings in which the wool is to be dyed alone, whether cross dyes, white effect, or a two-bath proposition, need only to be well wet out before dyeing. Neutral soap and a little ammonia at 110 deg. Fahr. does the trick in good shape.

Cotton and mercerized cotton are best prepared by boiling out in soda and soluble oil. This theory is particularly true if the goods have been stored any length of time.

Cotton and wool goods which are to be dyed union need a boiling out also. A half-hour's weak boil in 2 or 3 per cent of soluble oil prepares the goods with a minimum of shrinking and felting.

Cotton and rayon combinations may be advantageously dyed with no preliminary treatment.

There are so many different methods of dyeing hosiery, each with a particular object in view, that a complete survey of them would be tiring. The writer will confine himself to those of his personal experiences which he thinks may be of interest to others.

Worsted Cross Dyeing Over Sulphur Black Cotton.—Many styles of hose are made by knitting white worsted over Sulphur Black dyed cotton and subsequently cross dyeing the worsted. Often these goods are stored for a considerable length of time before the worsted is dyed. If the goods are chromed during or after cross dyeing, any partially decomposed sulphur-bearing matter is completely oxidized, rendered easily soluble, and removed from the goods.

Cotton Whites.—A white cotton effect in cotton-wool hose is easily produced by adding 3 or 4 per cent of acetic acid to the bath, either during or after the dyeing of the wool, adding ½ per cent of oxalic acid, and boiling five to ten minutes.

Union Dyeing.—The best results from a standpoint of finish and feel are produced on cotton-wool union-dyed hosiery if the dyestuffs are so chosen that the goods may be brought to the boil in one hour and boiled not over five minutes. The necessary dyestuff and 2 per cent of soluble oil should be added to the bath containing the boiled-out goods. The bath should be raised to the boil during one hour and sampled at the boil. During the hour the quantity of salt necessary to properly exhaust the bath should be *fed* on.

Two-Tone Union Dyeing.—Of course, two-tone dyeing of union goods hinges entirely on choice of proper dyestuffs. The same procedure used for solid shade union dyeing may advantageously be followed in the production of two-tone effects, except that it is better to stop the goods at 190 deg. Fahr. rather than the boil. One can get splendid results by slowly adding up to ½ per cent of acetic acid to the bath at 190 deg. Fahr. after the salt has all been fed on. Much brighter dyeings on the wool can be produced by the use of acid in this manner.

Cotton and Rayon.—Goods made of cotton and rayon may be dyed without scouring if 2 or 3 per cent of soluble oil is added to the bath. Due to the variation in dyeing properties of rayon from different manufacturers, it is impossible always to follow the same procedure. The writer has followed a general procedure which has one variable factor, temperature, to care for the differences in the various rayons. The unscoured goods to which 2 or 3 per cent of soluble oil has been added are raised to 100 deg. Fahr. The dyes are fed on during ten minutes at this temperature. The bath is then raised to 160 deg. Fahr. during forty-five minutes, during which time the necessary amount of salt, 10 to 20 per cent, is slowly fed on. At 160 deg. Fahr. the goods are examined to determine whether or not the rayon is heavy enough. If it is, the goods are sampled. If not, the temperature is raised 10 degrees for ten minutes and the goods again examined. In this way the cotton and rayon can be brought to the same depth and the goods will be level throughout.

A Study of Some Derivatives of Ortho-Cresotinic Anilide

Part II

Difficulty of Isolating Products of Coupling Reaction Reappears—Two Possible Reactions—Results of Azo-Coupling Study.

By FREDERICK S. BEATTIE and CARL TOEPLER

IN this paper is described another group of azo-compounds, obtained by coupling certain mono-substituted amines to the anilide of ortho-cresotinic acid. In the preceding portion of this research (this Journal, XV (19), 1926, p. 745, et seq.) we recorded products obtained through the azo-coupling of what might be termed more simply substituted and perhaps more common first components (primary amines) to the anilide in question. The amines of this present group are such as would probably come less commonly into use, in a study less extensive than we have had it in mind to make; but in a general and extensive investigation of this kind it is obviously of interest and importance to research the field to the limit of available suitable material. Many of the bases which we have employed were prepared in this laboratory especially for this present study.

In the previously-reported portion of our work we encountered a difficulty which has appeared again in the present section, and in a more pronounced degree.

Difficulty Encountered in Experiments

It will be noted, by reference to the previous paper (loc. cit.) that, in spite of the case of meta- and para-xylidines, it was impossible to isolate the solid products of the coupling-reaction, though it is briefly mentioned in that place that "coupling apparently took place." It seems well to state here that, in attempting to follow out

the coupling of the two diazotized xylidines to ortho-cresotinic anilide, a deep-brown coloration was produced in the mixture, though rather more slowly than in most of the other cases cited in that paper. The development of this deep color, parallel in its general aspect to similar cases in which a solid azo-compound had been formed (for example, ortho- and para-toluidine, mesidine and pseudocumidine, each, under the same circumstances, gave products ranging in color from ochre yellow to deep-brown; and in degree of ring-methylation these amines just mentioned stand immediately before and after the two xylidines). But in these two cases, after standing in the cold for times varying from three hours to five days (and the experiments repeated several times under varied conditions—see following), the dark liquids gave only small amounts of evil-smelling tar when acidified (to neutralize the excess of alkali and to liberate the hydroxyl group of the anilide residue), whether hydrochloric or acetic acids, concentrated or dilute, were used, and whether hot, warm, at ordinary temperature, or chilled in ice.

And, further, attempts to salt out a sodium salt of the expected azo-compound by saturation of the alkaline reaction-liquid with sodium chloride, sodium sulphate, or even sodium acetate or sodium nitrate, failed to yield any solid product; although in the case of several other successful couplings, so numerous that it is not worth while to mention them scientifically, a solid compound, presumably the sodium salt of the product on the hydroxyl group, separated out from the reaction-liquid spontaneously after standing for a short time, and was therefore brought into solution again before acidification, to precipitate the azo-compound.

In order to examine more thoroughly the case of these two first components, the xylidines, we have repeated the work with these two amines, and have varied the conditions prevailing in the solution almost beyond reason; in dilution, in variation of the amounts of caustic and of carbonated alkali from the bare theoretical amounts of 15 per cent excess of each, varying independently; with substitution of sodium acetate for carbonate (this, of course, for the neutralization of the free acid of the diazo-solution to be added); with sodium bicarbonate and with ammonium hydroxide substituted for the same purpose; and finally with the substitution of potassium compounds in place of the sodium compounds mentioned; but without our being able to alter the results.

In the work recorded in the latter part of this paper, we may cite another closely-related pair of amino-compounds, as an illustration of the same perplexing behavior, namely, amino-salicylic acid (5-amino-2-hydroxy-benzoic acid) and amino-cresotinic acid (2-hydroxy-3-methyl-5-amino-benzoic acid), whose close relation to each other will be evident if the reader will sketch for himself their structural formulae; a relation practically as close as that existing between the two xylidines which we have been discussing, though perhaps slightly different in degree. Our report upon these two amino-hydroxy acids is exactly that made for the two xylidines; a deep brown coloration appeared in the reaction mixture, but in no way that we could devise, by alteration of the composition of the reacting solutions, could we obtain a mixture from which anything beyond a scanty, unpromising tar could be gained.

It would be easy to dismiss our failure in these cases (and others) by ascribing the ill-success of the coupling to an unsuitable hydrogen-ion concentration; but we do not feel inclined to call in the aid of this to our mind rather overworked explanation of failure. For, let it be noted carefully, that coupling apparently did take place, judging by the development, without great delay, of a deep color of the sort to be expected from the nature of the amino-compound (judging, at least, by the color of the products largely obtained in other cases in this series). The point, for which we still feel unable to offer any explanation or hypothesis, is, that no solid compound nor homogeneous liquid can be obtained from the reaction liquids. It would hardly be reasonable to expect an azo-compound to occur as a liquid in the aromatic series.

Beside the coupling which was most to be anticipated, that is, in the para position to the hydroxyl group of the cresotinic anilide, there are two other possible reactions.

Elimination of Mineral Acid Possible

One of these is the elimination of mineral acid (as we used hydrochloric acid entirely in the diazotizations of all of the first components, this would be the acid eliminated) between the diazo-salt and the hydrogen of the hydroxyl in the second component, the result being a diazo-oxide or aryl-diazo-ether. Such compounds are by no means unknown. They are difficult, perhaps impossible, to prepare deliberately (that is, as the principal product desired), but do occur not infrequently as a by-product, especially when caustic alkali has been used in excess as the means of getting the second component into solution. This would be the situation in our particular case; the cresotinic anilide, having lost its free carboxyl group by anilidization, dissolving only in aqueous caustic (that is, beyond its very slight solubility in the water of the caustic solution). We find the formation of the diazo-oxides to take place really frequently when, for example, a non-sulphonated or non-carboxylated or non-hydroxylated amine is coupled to phenol, or the cresols, these being held in solution in caustic soda solution. The azo-products formed normally in such cases will dissolve more or less freely in aqueous caustic; when sufficient water is present, the products remain in solution as the phenolic sodium salts; in too great concentration, the solid sodium salts will usually separate out, but pass back promptly into solution on addition of more water or upon gentle heating.

But when the diazo-oxide possible is formed, it will precipitate as a solid, which, having no hydroxyl-group to make salt-formation possible, will remain insoluble.

and form the (usually) small amount of "insoluble matter" which is filtered off before the free azo-product is precipitated with acid. This "insoluble matter" is sometimes considered as the result of a dis-azo coupling, in both the para- and the ortho-positions to the directing hydroxyl group, the insolubility of such a product in caustic alkali being ascribed to the blocking up of the neighborhood of the hydroxyl group by the voluminous aryl-azo group, according to the theory of spatial interference. According to our investigations, this explanation of the origin of this "insoluble matter" is true only at times, or only partially so in a given instance, for the diazo-oxides are frequently the substances composing the material which will not dissolve in caustic.

Not many of these diazo-oxides have been isolated and described, obviously because these are usually regarded as an impurity in working toward a pure azo-compound, and because they (in contrast to the diazo-amino compounds, which are frequently formed quantitatively under the proper conditions, and are therefore available for study) cannot be obtained in satisfactory yields. They doubtless occur to an unsuspected extent in the large-scale production of azo dyes from sulphonated or carboxylated phenols and naphthols, but in these cases such diazo-oxides would be water or alkali-soluble by virtue of the acid groups in one or the other of the components, and their isolation for study, or merely the detection of their presence in the main product, might well be regarded as one of the absolutely hopeless tasks of chemistry.

In the particular cases under consideration, the possibility of a diazo-oxide compound being formed between diazotized xylidine and ortho-cresotinic anilide must be dismissed as improbable, for the product would have lost the free hydroxyl group through which it could dissolve in caustic alkali; and it may be recalled that the coupling-mixture in these cases developed a strong brown color, but deposited no solid, yielding only a tar upon acidification. It is true that, under some conditions, the hydrogen of the imino-group in the anilide-structure of the second component can be replaced by alkali metal, but this is not universally the case in the sulphon-anilides, with aqueous caustic; and with the carboxyl-anilides it is almost always necessary to use such conditions as absolute desiccation, metallic sodium in granular condition, and an inert medium such as xylene, at a temperature considerably above the ordinary one. Such a reaction is not to be expected as at all possible, under the routine aqueous conditions under which we produce azo-couplings.

Possibility of the Imino-Hydrogen

And the mention, just made, of the possibility of the imino-hydrogen in the anilide-region of the molecule of the second component leads us to the question whether the diazo-chloride might perhaps have accomplished coupling in that part of the cresotinic anilide through elimination of the imino-hydrogen, as hydrochloric acid. Such a reaction can, under some conditions, take place between a diazo-chloride and a simple imino-compound, such as diphenylamine, though here it takes place with difficulty, and only in a medium which is acid with acetic or formic acid. But we do not recall any published notice of any such reaction affecting the imino-group of an anilide. We should expect, in any case, that if this or the previous unusual coupling should take place, the product would be a solid, capable of crystallization from some solvent at least, instead of coming out as a liquid tar which still remained liquid after drying *in vacuo* over sulphuric acid for over three weeks.

We are less surprised at the failure of the amino-salicylic and amino-cresotinic acid (see data at close of this paper) to couple, in view of the well known fact that Eriochrome Flavine A cannot be produced by coupling diazotized amino-salicylic acid to salicylic acid, although this fact, which led Mettler to a successful synthesis of the dye by coupling diazotized 5-amino-2-chlor-benzoic acid to salicylic acid and then replacing the halogen by hydroxyl, is as yet without even a hypothetical explanation.

Azo-Couplings Studied

2-Amino-5-brom toluene: Olive-brown powder, m. p. 142°-143°. Ins. pet. ether, m. s. ethyl ether, not. v. s. all other solvents.

Calc. for $C_{21}H_{18}O_2N_3Br$; Br = 18.86%.
Found, 18.71%, 18.82%.

4-Amino-3-brom toluene: Ochre yellow powder, m. p. 168°-170°. Ins. pet. ether, m. s. methyl alcohol, ethyl alcohol, butyl alcohol, acetic acid, e. s. all other solvents. Solution colored orange.

Calc. for $C_{21}H_{18}O_2N_3Br$; Br = 18.86%.
Found, 18.63%, 18.75%

4-Chlor-2-nitroaniline: Dull ochre powder, m. p. 105°-106°. Ins. pet. ether, m. s. ethyl and methyl alcohols, d. s. all other solvents. Solution colored brownish-yellow.

Calc. for $C_{20}H_{15}O_4N_3Cl$; Cl = 8.95%.
Found, 8.83%, 8.89%.

2-Amino-4-chloranisole: Bright yellow powder, m. p. 224°-225°. Ins. pet. ether, not v. s. methyl and butyl alcohols, ethyl ether, toluene, carbon bisulphide, m. s. ethyl alcohol, chloroform, carbon tetrachloride. Solution colored deep yellow.

Calc. for $C_{21}H_{18}O_3N_3Cl$; Cl = 8.97%.
Found, 8.87%, 8.98%.

Anthranilic acid: Garnet red powder, m. p. 119°-120°, with decomposition. Ins. pet. ether, v. d. s. carbon bisulphide, carbon tetrachloride, e. s. all other solvents. Solution colored red-orange. The sodium salt was colored golden-orange, e. s. in water.

Calc. for $C_{21}H_{17}O_4N_3$, N = 11.2%.
Found, 11.12%, 11.19%.

m-Aminobenzoic acid: Red-orange powder, m. p. 225°-226°, with decomposition. Ins. pet. ether, benzene, v. v. d. s. carbon bisulphide, carbon tetrachloride, v. d. s. chloroform, d. s. ethyl, methyl, or butyl alcohols, e. s. ethyl ether. Solution colored orange. The sodium salt was colored deep reddish-orange, v. s. water.

Calc. for $C_{21}H_{17}O_4N_3$, N = 11.2%.
Found, 10.92%, 11.01%.

p-Aminobenzoic acid: Brick-red powder, m. p. 222°-223°, with decomposition. Ins. pet. ether, v. d. s. benzene, d. s. carbon bisulphide, carbon tetrachloride, chloroform, m. s. acetic acid, ethyl and butyl alcohols, e. s. methyl alcohol, ethyl ether. Solution colored orange-red. The sodium salt was colored deep golden red, v. s. cold water.

Calc. for $C_{21}H_{17}O_4N_3$, N = 11.2%.
Found, 10.88%, 10.94%.

Picramic acid: Dark dull-brown powder. Ins. pet. ether, benzene, carbon bisulphide, carbon tetrachloride, v. v. d. s. chloroform, d. s. ethyl ether, m. s. acetic acid, e. s. methyl, ethyl and butyl alcohols. Color of solution, brownish-orange.

Calc. for $C_{20}H_{15}O_7N_5$; N = 16.01%.
Found, 16.1%, 15.9%.

Amino-cresotinic acid: Couples to form a dark-brown solution, but no solid could be obtained.

Amino-salicylic acid: Failure, the substance reacting in a manner similar to amino-cresotinic acid.

Dehydro-thio-p-toluidine: Dull ochre powder, m. p. over 250°. Ins. pet. ether, carbon tetrachloride, v. d. s. benzene, acetic acid, ethyl ether, carbon bisulphide, e. s. methyl and ethyl alcohols, m. s. butyl alcohol. Solution colored golden-red.

Calc. for $C_{28}H_{22}O_2N_4S$; S = 6.72%.
Found, 6.79%, 6.84%.

Primuline Base: Dark, dull, red powder, m. p. over 250°. Ins. pet. ether, carbon tetrachloride, v. d. s. acetic acid, benzene, carbon bisulphide, ethyl ether, e. s. methyl, ethyl, and butyl alcohols. Solution colored orange-red.

Dehydro-thio-m-xylidine: Dull red powder, m. p. over 250°. Ins. pet. ether, carbon bisulphide, carbon tetrachloride, benzene, d. s. acetic acid, ethyl ether, e. s. methyl, ethyl, butyl alcohols. Solution colored red-brown.

Calc. for $C_{30}H_{26}O_2N_4S$; S = 6.32%.
Found, 6.17%, 6.11%.

Iso-dehydro-thio-m-xylidine: Dull red powder, m. p. over 250°. Ins. pet. ether, d. s. carbon tetrachloride, ethyl ether, m. s. benzene, butyl alcohol, e. s. methyl and ethyl alcohols, v. s. carbon bisulphide. Solution colored golden-red.

Calc. for $C_{30}H_{26}O_2N_4S$; S = 6.32%.
Found, 6.12%, 6.24%.

(To be continued)

HOW DEPARTMENT OF COMMERCE AIDS CHEMICAL INDUSTRY

[NOTE.—The following article, outlining the work of the Chemical Division of the Bureau of Foreign and Domestic Commerce, serves to explain how our chemical trade is being efficiently fostered by the Department of Commerce. This survey was written by the chief of the Chemical Division as one of a series appearing in the United States Daily.]

The United States is the greatest producer of chemicals and allied products, and is also the greatest consumer of these commodities. Before proceeding further, perhaps it would be well to cite the number and extent of the various phases of industry falling within the purview of the Chemical Division. Dyes, heavy and industrial chemicals and drugs and pharmaceuticals, obviously, are chemical products. In addition, this Division handles fertilizers and fertilizer materials, plastics, explosives, paints, naval stores, pigments, toilet preparations and many other items too numerous to mention.

The field of the Division's operations is broad and complex. It requires knowledge not only of the latest developments of commercial and trade significance but also of a scientific and technical nature. That which is a laboratory development to-day is an important item of trade and commerce to-morrow. There has been some misunderstanding of the character of the Division's activities. It should be remembered that this office has no test tubes or beakers to bother with; its tools and implements are statistics, reports and things of that nature.

As to the extent of the job mapped out for the Division it may be summarized by saying that it is to help the chemical industry to decide what can be sold, where it can be sold, when it can be sold, and how it can be sold. In common with all other divisions of the Bureau of Foreign and Domestic Commerce, the Chemical Division is fortunate in that it has no regulatory authority. It is charged with no policing or investigational duties. It has one obligation and one ambition, to render constructive assistance to the chemical industry in the United States.

The information gathered in the Chemical Division comes from the same sources as that collected in other Divisions—from the far-flung consular and diplomatic services of the United States, from the Foreign Service offices of the Department of Commerce, and as a result of special investigations of particular conditions.

Through its close co-operative contacts with the other Divisions of the Bureau of Foreign and Domestic Commerce, the Chemical Division is in a position to offer the chemical industry pertinent information on subjects such as foreign tariffs; the possibility of obtaining suitable foreign representatives and the standing and credit of individual prospective representatives; on the proper packing and marking of merchandise for export; on proper documentation of shipments to avoid delays and possible fines at foreign ports, and numerous other related subjects.

Standardization of Color Fastness*

Movement for Faster Colors in Germany—Establishing Standards—Practical Significance of the Work

By Dr. Paul Krais

Director of the Dresden Institute of Textile Research, President of the Section for the Chemistry of Dyes and Textiles of the Association of German Chemists.

TWENTY years ago, when I left England and settled down in the south of Germany, the dyeing of cotton yarns, woven goods and hosiery, and also of cotton warps for mixed goods, was restricted almost entirely to basic and direct dyestuffs, developed dyeings, Nitraniline Red, and sulphide dyestuffs; while fast shades could be produced only with Indigo and a few new vat dyestuffs, with Turkey Red, Aniline Black, and some vegetable and mineral dyes. The dyeing of wool was mostly done with acid dyestuffs, of which only very few were fast to light, so that very fast shades on wool could only be produced with Indigo and with mordant dyestuffs. It was often necessary to top fast dyes with fugitive dyestuffs, in order to match the required shades correctly, and the more an exact matching was stipulated, the less attention could be given to fastness. But even in 1906 there were many shades, which could be dyed very fast, especially in black, brown, navy blue, and similar colors of no great brilliancy.

In Germany I was astonished to find that much less attention was paid to the fastness of dyes in general than was the case in England, and I came to the conviction that it was not only the finer wool material and the more perfect finish and handle which gave the British goods, especially for men's clothing, an advantage over German goods, but also the higher degree of fastness of the dye. Let me give you one example only: half-wool linings fast to perspiration were at that time an almost unknown article in Germany, and neither tailors nor manufacturers were in a position to guarantee them to be fast. Nor did the public demand them, evidently not knowing that such a thing could be produced.

An Early Fastness Movement

This and many other observations, and also the total helplessness of the buying public, instigated me to publish an energetic "war cry" against bad quality in textiles, wall papers, dyed leather, etc. This was issued in 1907, and up to now 11,000 copies of this pamphlet have been printed. In this way a kind of "fastness movement" was begun, and the president of the Association of German Chemists—which at that time numbered about 3,000 members, and now has 8,000—asked me to convoke a section for the Chemistry of Dyes and Textiles. The first president of this section was Professor Moehlau, the second Professor Friedlaender, the third Dr. Lehne, and I have the honor to be the fourth. Further, in 1911, Professor Carl Duisberg, who was then president of the Chemists' Association and director general of the Bayer Company, suggested that the Section should elect a committee to investigate the question. This committee consisted of about thirty representatives of the dyeing, calico printing, and dyemaking industries, of the technical high schools, the textile schools, and of the German Patent Office.

After a general discussion, a sub-committee was elected in 1911, which now consists of twelve members, Dr. Lehne being president and the speaker secretary.

It was quite clear from the very beginning that we must either succeed in bringing about an understanding between producers and users of dyestuffs, or give up our task as hopeless. The happy constitution of our subcommittee and Dr. Lehne's versatile and conciliatory handling of difficult situations, were the salvation, and agreements were arrived at.

As regards the fastness properties of dyed wool and cotton, the norms and types proposed by Adolf Kertess, the well-known colorist, of Leopold Cassella, have been accepted with some very small alterations by the subcommittee. Silk has been treated much later, and here the proposals of Stephan Jost, of Basle, and Dr. Feubel, of Krefeld, slightly modified by Dr. Beil and Dr. Immerheiser, of the I. G., have been accepted.

Grading the Fastness Properties

The third report of the "Fastness Committee," containing the norms, types, and dyeing and testing instructions for dyeings on cotton, wool and silk, was issued in March, 1926. It contains the data concerning thirteen fastness properties of dyes on cotton, fifteen on wool and eleven on silk. At present the subcommittee is busy with the norming of artificial silks, and we hope to be able to submit our proposals to the Section at the next annual meeting of the German Chemists' Association in June, 1927.

One difficult question was, how the grades should be numbered. Should No. 1 be the best or the worst? Eventually it was decided that No. 1 should represent the lowest degree of fastness. As a rule five grades were adopted, though actually in many cases three of these only were used, that is, Nos. 1, 3 and 5. An exception was made with regard to the fastness to light of dyeings on cotton and wool, for which eight grades seemed necessary, because already in 1912 there was a series of dyestuffs which are more stable than the textile material itself. It was also recognized that new inventions might lead to still faster dyes, and therefore we might arrive at a dead point by numbering the fastest type No. 1.

In order to make reference more easy and precise, it

*Paper presented before the Society of Dyers and Colorists and published in its Journal.

was decided to indicate each type dyestuff by its number in the Schultz-Julius tables.

The most difficult question is *fastness to light*, and after much deliberation the committee has decided upon a series of types consisting of blue, violet, red, black, green, yellow, and gray dyeings with individual dyestuffs. This was a compromise, and it is not surprising that the decision has been criticized. But it is perfectly clear that the fastness to light, e. g., of a red shade, cannot with certainty be judged by comparing it with the fastness of a black. So, if simple type colors had been adopted, it would have been necessary to standardize a series of types at least for yellow, orange, red, violet, blue, green, brown, and black. This is what the dyemakers do; but it is important to recognize that there is an essential difference. In one case the general and special fastness properties of a *dyestuff* are to be ascertained, in the other those of a commercial *dyed material*. With new dyestuffs, for instance, which have to be introduced into commerce, the first question will be, how they compare with other dyestuffs of the same hue. On the other hand, in the case of a *dyed textile* the use of one dyestuff only is the exception; most are dyed with mixtures, and the question is not how they compare with other *dyestuffs*, but with other *dyeings*. It must be strictly understood that the committee's task was not to determine and standardize the fastness of single dyestuffs, but that of commercial dyed materials.

Tests with Victoria Blue

I have made many attempts to measure the results of the effect of light on dyed fabrics, paintings, wallpapers, etc., and found all chemical, physical, photographic and photochemic methods unsatisfactory. I then prepared lakes of sensitive basic dyestuffs, such as Malachite Green, Safranine, and Victoria Blue, and found that Victoria Blue B, precipitated on china clay, gives a blue pigment of just the suitable sensitiveness, so that a kind of scale can be made, which up to four hours' sunlight shows a marked difference for every half-hour's exposure. This was published in 1911. Of course, this is not an absolute, but only a relative measure. The bleaching of this blue proceeds about 30 per cent quicker in Arosa than it does in Dresden, and therefore it is necessary to make a special scale for every place in which trials are to be made. But when this is once done, then the measuring is quite simple. Every sunny day, in summer time even twice a day, a little slip of the blue paper is put beside the dyeings exposed, and by comparing the slips, after insolation, with the scale, the number of sunlight hours or of "bleaching hours" as I call them, is found and added together until the desired period of exposure is reached. Thus we can, within limits which are near enough for our purpose, repeat every exposure period we want, independent of season and of general weather conditions.

Many trials have been made to accelerate the testing by using artificial light or special condensing lenses, but all these have proved unsatisfactory. For instance, the quartz lamp has been proved by Paul Heermann to give different results from sunlight in 10 to 30 per cent of the cases.

One of the most serious difficulties in comparing the fastness to light of various dyeings is the circumstance that the shades do not fade in the same way. One shade may fade in the true sense, that is, the amount of color becomes less and less, and the amount of white more and more. This, however, is a very rare case. Mostly the shades alter in hue; they become grayish, brownish, etc., so that it is very difficult to say what proportion of its color a shade has lost.

In this regard Professor Haller, a member of the subcommittee, has laid stress on the fact that in calico printing not merely the fastness to light of the prints can be made the basis for judgment, since it is impossible to produce the illuminating colors of a print of the same fastness as the ground. In these cases, he says, one must ask whether the total impression of a print to the eye is still an agreeable one or not, even after the illuminating colors have faded.

All these circumstances must be kept well under consideration, and the closer investigation, whether and how far our types have been selected correctly, was restricted, for the time being, to two points—firstly, to expose the dyeings during a series of periods of equal length, that is, of an equal number of bleaching hours; and, secondly, to make colorimetric measurements of the shades before and after exposure. The first point is covered by the use of the Victoria Blue paper, exposing a definite number of bleaching hours; the second has been investigated by the color measuring methods of Wilhelm Ostwald, which lately have been improved essentially by Professor Pulfrich, of the Zeiss Works at Jena, and by Professor Krueger, of Dresden.

Another very difficult question is the test for *fastness to perspiration*. The reason is that sweat, perhaps still more than blood, is a very peculiar liquid. It can be acid, neutral, or alkaline; it can contain larger or smaller quantities of salt and of organic compounds, which more or less quickly lead to fermentation. All this varies according to the person who perspires, the quantity secreted, the temperature and the degree of cleanliness prevailing on skin and clothing. So it seems almost impossible to fix upon a method which can be adopted generally, because even the practical wearing trials have not given uniform results. Here also it was necessary to compromise, and at last the method used by the Farbwerke Meister Lucius & Bruning was adopted. It consists of using a solution containing 50 g. common salt and 2 c.c. concentrated ammonia liquor in 1 l. distilled water. The pattern to be tested is laid between white wool and cotton, and soaked in the solution at 45 deg. Cent. for a quarter of an hour, then pressed and dried. But this test is to be considered as a provisional one.

It is obvious that the work of the "Fastness Committee" has been criticized from more than one side. Most

frequently the objection is made that the whole thing was much too complicated to be of practical use. If one of those critics would have been present at our meetings, then he would have seen how much pains was taken in order to render the whole system as simple as possible. I do not think that the three fastness norms which have been fixed in the majority of cases are too many. Generally one may say that norm I is not fast, III medium fast, and V very fast. That the differences had to be gradual is evident, because in many cases a medium fastness is quite sufficient, as we don't require ladies' ball dresses to be fast to light, nor furniture fabrics fast to washing.

Another objection was that the definitions of the norms were not sufficiently concise and clear, so that at a lawsuit nothing could be definitely proved by them. Well, it was not the task to create a law codex, but to bring order and clearness into a subject which had been very hazy and uncertain before.

Practical Acceptance of the Standards

We have asked ourselves more than once whether our work would be only of theoretical value, or whether it would be accepted by the practical dyer. At the present time we can state with satisfaction that the large German firms of dyemakers use the norms for their daily routine work. The Badische Anilin & Sodafabrik have issued a booklet containing in the form of tables all their dyestuffs in the order of their fastness properties according to the E.K.-norms, as we call them in abbreviation. In the new dyestuffs pattern cards and circulars these norms are also used. The German Patent Office has accepted them, and also a number of textile schools and laboratories in Germany. The Society of Swedish Dyers at Goeteborg accepted our report last summer, after I had read to its members a paper about it. It has been translated into the Swedish language.

We know very well that similar committees to ours are at work in England and in America, and there is probably a necessity for this, in so far as the requirements in different countries and climates are somewhat different, and also the requirements of the public. Still I think it would save much work and discussion if the German E.K.-norms would be accepted as an international basis, and if alterations or improvements of and additions to these norms would only be made after a trial had been made to come to a mutual understanding.

Plans have been completed and the contract let on June 22 for the Magnolia Cotton Mill, Magnolia, Ark. The proposed plant is to have 5,000 spindles and will operate both night and day. Plans were drawn in the office of J. E. Sirrine & Co., Greenville. No Greenville firms are bidding for the construction of the plant, it is understood.

Recent Advances in the Identification of Azo Dyes

By W. C. Holmes
Color Laboratory, Bureau of Chemistry.

SINCE the recent publication of "The Reduction Products of Azo Dyes" in serial form in this journal, two important publications have appeared with bearing upon the identification of azo dyes.

The September, 1926, issue of the Journal of the Society of Dyers and Colourists contained a paper by Forster and Hanson on "The Identification of the Naphthalenoid Reduction Products of Azo Dyes," which deals with reduced azo coupling components with particular reference to amino-sulphonic acids.

The general principles followed are similar to those of the original procedures advocated by Green in his "Analysis of Dyestuffs." The reduction of azo dyes and the isolation of their reduction products are considered in considerable detail, and an apparatus is described for the convenient extraction of free amino-phenols from aqueous solutions. The isolated amino-naphthalene sulphonic acids and, in some instances, amino-naphthols and naphthalene diamines, are recognized by their characteristic color reactions when their ammoniacal solutions are poured onto filter paper and the (1) moist and (2) dried paper is spotted with suitable reagents. The reagents used are concontrated hydrochloric acid, ferric chloride, vanadium chloride, potassium dichromate, nickle chloride, uranium chloride, potassium ferro- and ferricyanides, copper sulphate, Schweitzer's reagent, ferrous ammonium sulphate, cobalt nitrate and silver nitrate. The reactions of thirty-nine reduction products are tabulated.

New Data from German Source

The second considerable body of data is found in Fierz-David's "Kunstliche organische Farbstoffe" (Julius Springer, Berlin, 1926) which constitutes the third volume of Herzog's "Technologie der Textilfasern." The material was taken from an unpublished dissertation by Peter, Mayer, Wegmann and Marshall.

The characteristic properties of a large number of the more important reduction products of azo dyes are described and spectroscopic data are supplied for the identification of seventy-one compounds. Although the application of spectroscopic methods in this connection is by no means novel, no extensive collection of data has hitherto been made available for the purpose.

A variety of means are employed in obtaining colored products for examination. Amidosulphonic acids are usually coupled with β-*naphthol*. The sulphonic acids of naphthalenediamines are condensed with phenanthrenequinone yielding characteristic azines which, in turn, yield characteristic eurhodols on alkaline fusion. The amidonaphthol sulphonic acids are diazotized in the presence of copper chloride in neutral solution and coupled with

resorcin in alkaline solution. In other instances characteristic solutions are obtained by oxidation or other simple means.

The types of absorption bands are recorded as well as the spectral locations of their maxima. In numerous instances modifications in spectra with change in solvent are given. In the majority of instances the data obtained appear adequate for the positive identification of the compounds in question. It seems probable that spectroscopic methods will frequently afford the most decisive means available for differentiating between reduction products of closely related dyes.

Practical Hints on the Production of Bright Colors on Textile Fabrics

Part XXIX

Topping with Acetic Acid—Operation of the Plant—Its Features and Advantages—A Multi-Bath Topping Machine—Its Operation and Special Features—Topping with Sulphate of Alumina

(*Continued from page 376*)

By RAFFAELE SANSONE

IN some establishments, where topping is conducted with the Methylene Blues, the Rhodamines, the Methyl Violets and other common basic colors, it is customary to treat the well-rinsed cotton material, after its dyeing in the sulphur colors, in a bath containing from 2 to 5 per cent of acetic acid on the weight of the goods treated, calculating a quantity of water that varies from twenty to fifty times the weight of the cloth, in accordance with the class of dyestuffs used or the nature of the material treated. The dyed cotton cloth is often topped in a cold or lukewarm bath. Some dyers, however, carry out the treatment in the cold, and then for exhausting the bath raise gradually to 100 deg. Fahr. and 105 deg. Fahr., treating at this temperature for a short period of time, and following with a rinsing and drying.

A plant sometimes employed for topping with cold baths is constructed on the principle shown in Fig. 1.

This machine consists of a substantial pair of cast-iron frames, E and H, the upper part of which is furnished with three square-sectioned wooden beams T, while the rest, which becomes broader toward the bottom and terminates in a wide basement, is fitted solidly to the flooring of the works. This contains three bowls, A, B, C, of which the top and bottom are usually of rubber, and the middle of copper-plated iron or other suitable material. Just before the nip produced by bowls B and C on the front of the machine, and where the cloth enters, is placed a small binding roller.

A trough N, fitted with one upper and three lower binding rollers, is furnished underneath. In some machines this trough can be raised or lowered by means of a rack-motion and a hand-wheel, to facilitate the threading-in operations and cleaning when this is conducted. The material of trough N is chosen with care to resisting the action of acetic acid. Generally an iron-silicon alloy is preferred; or an iron vat lined inside and covered outside with glass or copper.

At the back of trough N is placed the pocket R, through which the potting solution is introduced; it makes its way into the treating bath in vat N through numerous holes. At a short distance above pocket R is placed a copper-plated iron guide roller Y, and just behind squeeze bowl B a second guide roller O for the cloth. The last also serves to protect the operatives from accidents caused by the catching of their fingers, hands, or clothes between the rollers A and B.

On the front of vat N are placed upper arms supporting a cloth-spreading and tension arrangement G, the action of which can be regulated at will through the turning of a wheel; while at the bottom of the vat is a large discharge-tap with a tube to lead the old potting baths or rinsing water to the waste water main, or wherever else it may be required.

The nip formed by the upper bowls A and B is fitted with compound lever pressure, produced by levers I, I, and weights Z, Z, and regulated through upper screw-wheels, kept under the action of toothed-wheels and of the hand-wheel M. The nip of the bottom bowls B and C is under the action of springs or of hydraulic pressure, as may be more convenient, which, however, can be instantly eliminated whenever necessary. The bearings sustaining the three bowls A, B, C, make part of the steel plates T and U, and the first can be taken out at any moment with the greatest ease, should this be necessary for repairing or cleaning.

The short end-shafts at one side of bowls A, B, C, have machine-cut pinion-wheels with guards, driven at several speeds by a mechanism worked by the fast and loose pulley S, on which a leather belt running from an upper transmission can be moved backwards and forwards by a lower guard, controlled with a small hand-wheel. In some machines the end-shafts of bowls A, B, C, are contained in ring-bearings with liberal and constant

lubrication, while in others these are replaced by ball-bearings, especially when a noiseless drive is wished.

Operation of the Plant

Before starting any work on this plant the large hand-wheel M is turned to raise the upper bowl A, lowering at the same time bowl C by eliminating the action of the springs or of the hydraulic pressure. In this way a small space is left between the nips of the three rollers.

Two strong hemp ropes are then tied to the ends of the first colored cotton fabric to be treated, and entered at first through the spreading and tension-giving disposition G, passing later from here on the nearest three binding-rollers in trough N, and through the nip of the lower bowls B and C. From here the strings are made to pass on the last binding roller, generally at the back of trough N, and after raising on guiding-rollers Y and O, they are entered between the nip formed by bowls A and B, being carried from this to an upper cylindrical tube, and to a separate cloth-plaiting mechanism.

When the strings have been entered the potting bath is prepared in a vat at the back of the plant, supplied with a mechanical agitator, and placed at a short height on a raised iron platform, to which the operatives have access through a low iron stairs. The bath is then run into vat N through a tap and tube, and when a certain height has been reached all excess of liquid runs out through an overflow tube on trough N leading to a cement collection cistern, from which it can be pumped into a strengthening vat also placed on the upper platform already indicated.

At this point the plant is started. The cotton cloth, after passing between the spreading bars T, descends to the tension-giving disposition G, where it receives a further spreading, and is delivered downwards to the first three binding-rollers in trough N. Here it is wet out properly and delivered upwards to the guide roller before the nip of bowls B and G, between which it passes, receiving a light squeeze if spring pressure is applied on bowl G, or a strong squeeze if hydraulic pressure is instead used.

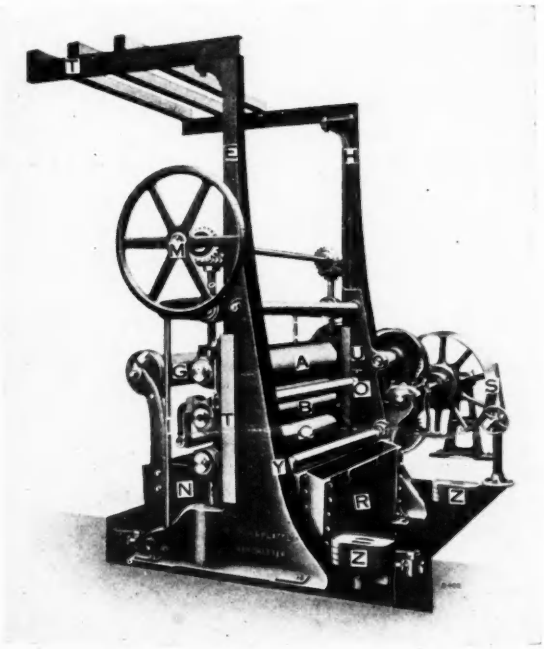

Fig. 1

From here it descends again into the bath of treatment to receive a second impregnation, while passing on the binding roller still free for mounting ot guiding-rollers Y and O, and is taken up on the batching device already indicated.

In the meanwhile the topping bath continues its passage through trough N, where the untreated material entering comes in contact with continually renewed bath. As one piece of dyed cotton cloth has nearly been completely entered on bars T, the end of a second piece is rapidly sewn on through one of the usual sewing machines, continuing the operation until the whole lot of material has been treated. In the meanwhile the cloth, plaited separately at the back of the machine, has piled up and is carried on a truck to the drying department, this being repeated after the formation of a certain number of pieces.

Features and Advantages of the Plant

Several advantages are secured through the employment of this plant, among which may be mentioned the following:

1. The cotton cloth dyed with the sulphur colors is given a double impregnation in the topping bath, having thus sufficient time to absorb the required quantity of dyestuff.

2. The cotton cloth can be given a light or heavy squeeze during its passage through the nip formed by bowls C and B.

3. The speed of treatment adopted in each case can be varied in accordance with the thickness of the material, its construction or the intensity of the topping required.

4. In many cases if the cotton cloth has been properly rinsed after the dyeing, it will be possible to pass through the machine continuously articles dyed in different colors, without changing the topping bath, simply continuing to strengthen it for use again as long as possible.

5. Through the strengthening of the old topping baths and their re-employment, the circulation bath used can be reduced to quite a low volume.

6. The production in topped cloth is large, and the uniformity of the treatment guaranteed through the double impregnation and pressing.

A Multi-Bath Topping Machine

A plant in which the topping operations can be performed by using several topping baths and colors repeatedly could be constructed on the principle shown in Fig. 2.

Here is seen a rectangular vat K, the iron plates of which are all machined at the joints so that no caulking is required as in some types. The interior of the vat, however, is lined with a thick layer of copper or glass, to prevent the contact of the cotton material with rusty portions, or rust in the different baths of treatment, which would invariably stain the material.

Vat K stands directly on the flooring of the works, and has several outlet tubes with taps placed in a line at the rear. Through these all rinsing water entered through an upper spraying-arrangement J is caused to flow out from several portions straight into the waste water main, the rapidity of the flow being regulated at will, varied in accordance with the heaviest delivery of water allowed by the works supply and the lowest still allowed by the tap on the spraying arrangement itself.

On the left of the upper portion of vat K is placed a first pair of squeezing rollers G, supplied with spring-pressure, regulated through an upper screw-wheel, and that also serves for separating the two rollers. On the right is a second pair of squeeze rollers H, of exactly the same type as the first, and just behind this two high arms M, supplied with the pair of squeeze rollers O and the swinging arrangement P, for forming the cloth into pieces on a low wooden table B. The two pairs of squeeze rollers G and H, the squeeze rollers O and the swinging device P are all worked by the same mechanism, which operates all moving parts on the rest of the plant and the upper guide rollers m in the interior of vat K. The lower guide-rollers n are, however, run loose in this instance.

On the left of vat K is arranged a pair of copper-plated iron bars C, which reach frame E. This frame passes below the flooring of the works, where is placed a narrow channel Q. On the opposite side of the narrow channel are placed the frames W, which mount upwards, reaching the top of vat K. On the flooring of channel Q is placed the upper part of a hollow iron cylinder or shell, containing the steel piston L, which can be placed under the action of hydraulic pressure, when it is necessary to raise the iron platform Z, which supports a dyeing trough I, constructed in the form of a small wagon, and of iron copper-plated on the outside and inside. The small wagon runs on iron wheels u and r.

Between the pair of bars C is placed a special device, through which an internal cage H can be raised up to a certain height above the bars, or lowered to remain just below these, by the simple movement of a hand-lever. Cage H contains an upper and lower series of guide-rollers of glass or other suitable material, both of which run loosely on their short end-shafts contained in special bearings, without offering the slightest resistance to the passage of the cotton cloth. If needs be, however, they can be driven by small pinion-wheels, fixed on one of their end-shafts, and connected with the rest of the mechanism driving the plant. Trough H contains a large outlet cock.

The upper portion of framing E is disposed in such a manner that the exact position to be occupied by the dyed cotton cloth led upwards from table A, can be regulated from the start while passing on the spreading bars a, b, c, d, e, f, and on roller g. Collars are moved and fixed on roller g between which the cloth can be made to pass before descending into trough I. In front of and behind squeeze rollers G and H are also arrangements for regulating the position of the cloth.

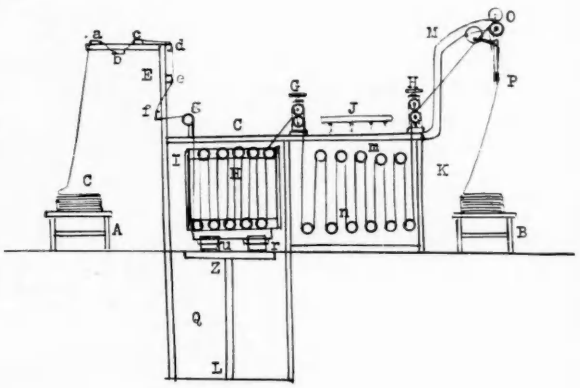

FIG. 2

Channel Q has on both sides a round room, in which the small wagons can be maneuvered or charged with the necessary water and topping colors required. From either of such rooms the wagons can be brought to the upper chamber through a prolongation of the channel itself, which, however, is inclined and permits a gradual mounting. Both prolongations serve also for the entrance for operatives and dyers.

Six or more troughs of the same size and material as trough I are kept in one of the round rooms awaiting employment, being charged there with the topping colors; their contents are discharged when necessary into the waste water main through a side excavation in both rooms. The plant is driven at any desired speed by a special mechanism worked by an electric motor, steam engine, gas engine or other suitable means.

OPERATION OF THE PLANT

To perform continuous work, two narrow cotton or hemp tapes are run through all portions of the plant, leaving their ends hanging to the same extent in both cases from bar a on framing E, and their ends hanging from the folding arrangement P. After this, clean running water is turned on in the spraying device J, which delivers it at the top of vat K in the form of a fine shower, the intensity of which can be varied at pleasure, by simply opening more or closing somewhat the tap in connection with the same.

When vat K has thus been filled to four-fifths the line of taps at its rear are opened so that the bath remains at the same height, however rapidly it is circulated by ma-

(*Continued on page* 419)

Proceedings of the American Association of Textile Chemists and Colorists

The American Association of Textile Chemists and Colorists

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RESEARCH ASSOCIATE

At the Forty-fifth Council Meeting of the American Association of Textile Chemists and Colorists, held April 29, 1927, it was voted to appoint a Research Associate to work in co-operation with the Bureau of Standards, in accordance with their system of such associates. In accordance with this vote, the following letter was forwarded to the Director of the Bureau of Standards:

The American Association of Textile Chemists and Colorists hereby makes application for the establishment of a Research Associateship at the Bureau of Standards, for one year, beginning some time this month.

Our Association appreciates the co-operative spirit which has been displayed by the Bureau of Standards, particularly through the work and assistance rendered by William D. Appel as a member of our Research Committee, and we wish to have the co-operation between the Bureau and our Association even greater in the future than it has been in the past, and it is with this in mind that we are planning to establish such a Research Associateship.

It is the feeling of our Council that the work done by such an Associate should constitute one of the important activities of our Association; also that such an Associate should be working fundamentally in our interests at all times, and that preference should be given to the Proceedings of our Association for the publication of any reports or statements in regard to such work as he may do.

It is also the understanding of the Council that should it be found desirable to transfer such an Associate to another laboratory for a longer or shorter period of time, this may be readily arranged.

Trusting that this will meet with your approval, I am, Very truly yours,

L. A. OLNEY, *President.*

At the Forty-sixth Council Meeting, held Friday, June 17, it was voted to recommend to the Bureau of Standards the appointment of William C. Smith as Research Associate for the coming year.

William C. Smith graduated from the four-year course in textile chemistry and dyeing at the Lowell Textile School in 1926. Since graduation he has held the position of textile chemist with the Utica Willowvale Bleaching Company, of Chadwicks, N. Y. He also worked for this company during the four previous summers, both in the laboratory and in the plant, and his experience includes both technical and applied work in bleaching, dyeing and finishing.

It was the opinion of the Council that his training in general and textile chemistry received at the Lowell Textile School, together with his practical experience, would qualify him to fill the above-mentioned position. Mr. Smith received several prizes for high scholarship attained at the Lowell Textile School, was president of his class during his sophomore and senior years,

and was also president of the Lowell Textile Junior Section of the American Association of Textile Chemists and Colorists. He was also prominent in the general school activities and athletics.

The expense of this Research Associateship will be paid from the funds of the Association. It is believed that this arrangement will greatly facilitate the work of the Research Committee, and it is hoped that financial support derived from Corporation Memberships will make it possible to appoint other research associates later on.

ANNUAL OUTING OF NORTHERN NEW ENGLAND SECTION

On Friday, June 10, 1927, members and guests of the Northern New England Section to the number of 130, gathered at the North Shore Golf and Country Club, Salem, Mass., for their fourth annual outing.

A grand day it proved to be—in weather, grounds, sports, banquet and spirit. Golf was the popular sport of the day. The golfers came early, recorded their handicaps and played late. Likewise did the non-contesting bench-warmers on the clubhouse verandah, where the cooling breezes played. This cheerful group made first contacts with all of the new-comers and by reflecting and instilling into them the congenial atmosphere which pervaded the whole affair, made things start right for each and everyone. Tennis had its red-hot participants and loyal supporters. Several live matches in singles and doubles kept activity in "high." Promptly on the hour scheduled in "The Gentleman Chemist" (official organ of the Outing Committee for this day), the pipe race and then the baseball games came into being. As usual, these events came near being a riot—of fun and rivalry. So much so that a strong Pacific team is already organizing to challenge, peacefully, all comers at next year's outing.

Most of the Outing Committee

About this time, when all active events of the afternoon were finished, and when the showers had performed their tasks, there began to be a little strain. The open air and the bright sunshine, the exertions brought forth in the sporting events and the negligence of the large group of welcome attenders who had failed to make previous reservation for the banquet, had been putting in subtle "licks" which until now had been paid but scant attention. Now the effects of such a course became painfully evident as the caterer made frantic efforts to squeeze in more places and to redivide the food so that the good things might still cover the bill. Hunger stalked in the crowd.

A Trio of Golfers

Finally there rang out over the famish-hushed group the merry call, "Let's eat!" Bedlam was loose in an instant, as were also some of the numerous narrow doors on their hinges, and the mob stormed into the banquet hall. It was but the work of a few minutes for that expectant gang to seat themselves and become aware, as by an apparent crescendo, of sweet strains of orchestral music. Thus vigorously did the banquet, the long awaited banquet, begin. And thus vigorously did it proceed, except as it was interrupted by a community song, or by the falsetto voice of an old women, bidden to the feast, and then rejected (Mr. Zillerson in a humorous impersonation), or by other bits of entertainment.

At last the fullest capacity was reached. Consumption languished. Then it was that Outing Chairman John Grady rose to the occasion (as he had so often done before in the preparations for this affair), and stimulated

interest to a fever pitch by announcing the winners of the sports. In a few well-chosen words he commended them for their excellent sportmanship amid the gruelling contests, and presented them with the prizes to which

Victors in the Pipe Race and Quoits Tournament—Atkinson (left), and Spurr (right).

they as victors were honorably entitled. The prize winners were accorded a hearty round of applause as they carried away the trophies.

The winners of the various events were as follows:

Golf—Members: Low gross, Al Pierce; low net, William Brandy; second low gross, John Grady. Guests: Low gross, Sidney David; low net, tie between Nick Brown and John Dalton; second low gross, Harry Stevenson.

Tennis—Singles: Val Sjostrom. Doubles: John Watson and Alan Claflin.

Baseball—Dye Chemists victors over the Mill Men.

Pipe Race—Reginald Atkinson.

Tennis ". . . red hot participants." Northern New England Section Outing.

Quoits—Atkinson and Spurr.

At the conclusion of these announcements, Chairman Harold Leitch recalled how in former years valuable services had been rendered to the outing by Al Sampson in the capacity of chairman of the committee. Mr. Leitch surprised this latter gentleman by calling him to the front where he was presented with a gold cigarette case as a token of the appreciation of the Section. Sampson recovered rapidly and made a fitting reply of thanks. This event concluded the program of entertainment.

The final announcement of the evening was that giving the result of the recent ballot vote for officers of the Section for the coming year. During the afternoon the ballots had been counted by a committee comprised of Mr. Mason, chairman, Mr. Gile and Mr. Backup. Mr. Mason reported that the ballot had given a majority, and therefore the election of the following:

Chairman, Harold Leitch; treasurer, Walter Durfee; secretary, Arthur Johnson; members of the Executive Committee for two years, Henry Grimes and Walter Haskell.

One of the Fussy Foursomes.

These, together with Hugh Christison and John Bannon, will serve as the Executive Committee for the season of 1927-1928.

Those who served on the Outing Committee for 1927 were: John H. Grady, chairman; Harold Leitch, chairman ex-officio; John Bannon, Thomas Biery, William Brandy, Louis Bume, Hugh Christison, Harold Gile, Henry D. Grimes, M. J. Lane, Frank Johnson, Ernest Johnson, Frank McCool, Albert Sampson, George Stewart, Walter Zillerson.

Great credit is due to the committee for the grand success of the occasion. This is testified to by the fact that everyone who attended the outing went home with a warm feeling of appreciation for the Outing Committee in his innermost self.

The photos used in this report are published through the courtesy of Fiber and Fabric.

Prominent Spectators—New England Section Outing.

ANNUAL OUTING OF THE NEW YORK SECTION

Not because Tuesday, June 21, was the first day of summer, but because it was the date set for the annual outing of the New York Section of the American Association of Textile Chemists and Colorists—this, the members declared, was the chief reason for the ideal weather that contributed so much to the full enjoyment of their day.

When the first few cars of early arrivals drove through the gateway of the Elmwood Country Club, situated just beyond the suburbs of Paterson, N. J., the green expanse of the links reflected a golden warmth from the morning sun that presaged a torrid day. Before the sun had set it did become just a little uncomfortable for those indefatigables who insisted on playing thirty-six holes before dinner. For the others the day was perfect.

Several foursomes were on the green before the dew was dry. By the time these morning players were drifting back to the club for lunch many more members and their guests had arrived and were removing coats and climbing into plus-fours. While the golfing continued during the long afternoon, the baseball

Eight and a Half—The Winning Ball Team at New England Section Outing.

The Doubles Tennis Champs—John Watson and Alan Claflin of N. N. E. Section

teams met on the field near the ninth hole. Although Captain Herbert Grandage of the Mill Guys was regrettably delayed, he reached the field in time to learn that his team was well in the lead. It eventually captured the coveted prize from the Dyestuffers and incidentally helped to entertain the spectators with as lively a game as ever was played by these noted teams.

Meanwhile, on the sun-baked courts near by, several energetic members lustily swung their rackets all afternoon and until shortly before the dinner call. When the sportsmen returned to the club in perspiring groups from links, field and court, the competition for cold showers ran high.

Dinner was served in the club dining room at eight o'clock, and at this time announcement was made of the winners of trophies for the day's events. In the golf tournament, the handsome silver Chairman's Cup, donated by Samuel L. Hayes, present chairman of the New York Section, was awarded to P. A. McKinney for low gross score. The REPORTER Cup for the low net was taken this year by Daniel F. Clarenbach. Three players being tied for the kicker's prize, a golf club, lots were drawn and the club awarded to Charles F. Schaumann. A tennis racket was presented to Dr. George W. Knight for his prowess on the courts.

Dyes Imported Through New York and Other Ports During May

Compiled by the Chemical Division of the Bureau of Foreign and Domestic Commerce in Collaboration with the Chemical Division of the United States Tariff Commission

KEY TO ABBREVIATIONS OF MANUFACTURERS' NAMES

1—THE SIX LEADING GERMAN COMPANIES

IG—Interessen-Gemeinschaft der Farbenindustrie.
A—Actien-Gesellschaft fur Anilin-Fabrikation, Berlin. Founded 1873.
B—Badische Anilin-und-Soda-Fabrik, Ludwigshafen-on-the-Rhine. Founded 1865.
By—Farbenfabriken, vormals Friedr. Bayer & Co., Leverkusen-on-the-Rhine. Founded 1862
C—Leopold Cassella & Co., Frankfort-on-the-Main. Founded 1870.
K—Kalle & Co., A. G., Biebrich-on-the-Rhine. Founded 1870.
M—Farbwerke, vormals Meister Lucius & Bruning, Hochst-on-the Main. Founded 1862.

2—THE SMALLER GERMAN COMPANIES

BK—Leipziger Anilinfabrik Boyer & Kegel, Furstenberg, near Leipzig. Founded 1882.
CG—Chemikaliewerk Griesheim G. m. b. H., Griesheim-on-the-Main. Founded 1882.
CJ—Carl Jager G. m. b. H., Anilinfarbenfabrik, Dusseldorf. Founded 1823
GrE—Chemische Fabrik Griesheim-Electron, Offenbach-on-the-Main. Founded 1842.
L—Farbwerk Mulheim, vormals A. Leonhardt & Co., Mulheim-on-the-Main. Founded 1879
Seig.—G. Seigle Corporation, Stuttgart.
tM—Chemische Fabriken, vormals Weiler ter Meer, Uerdingen-on-the-Rhine. Founded 1877.
WD—Wulfing, Dahl & Co., A. G. Barmen. Founded 1842.

3—SWISS COMPANIES (ALL AT BASEL)

DH—Farbwerke vormals L. Durand, Huguenin & Co. Founded 1871.
G—Anilinfarben-und Extract-Fabriken, vormals Joh. Rud. Geigy. Founded 1764.
I—Gesellschaft fur chemische Industrie. Founded 1885.
S—Chemische Fabrik, vormals Sandoz & Co. Founded 1887

4—DUTCH AND FRENCH COMPANIES

FA—Farbwerk Ammersfoort, Ammersfoort, Netherlands. Founded 1888
NF—Niederlandische Farben-und-Chemikalienfabrik Delft, Delft, Netherlands. Founded 1897.
CN—Compagnie Nationale de Matieres Colorantes et Produits Chimiques. Founded 1917. (Etablissements Kuhlmann merged with this company in 1923.)
P—Societe Anonyme des Matieres Colorantes et Produits Chimiques St. Denis (formerly A. Poirrier). Founded 1830.

5—ENGLISH COMPANIES

Bro—Brotherton & Co., Ltd., City Chambers, Leeds.
BAC—British Alizarine Co., Ltd., Manchester
BD—British Dyestuffs Corporation, Ltd., London.
Cl Co.—The Clayton Aniline Co., Ltd., Clayton, Manchester.
CV—The Colne Vale Dye & Chemical Co., Ltd., Milnsbridge, Huddersfield.
Hol—L. B. Holliday & Co., Ltd., Huddersfield.
Scot—Scottish Dyes, Ltd., Grangemouth.

COAL-TAR dyes imported through New York and other ports during the month of May totaled 349,476 pounds, with an invoice value of $265,752. Imports by ports were as follows: New York, 332,541 pounds, valued at $253,236; Boston, 13,456 pounds, valued at $10,554; Albany, 3,479 pounds, valued at $1,962. A detailed tabulation of the monthly imports is published below:

Per Cent of Dyes by Country of Shipment

	May 1927	May 1926	Jan.-May 1927	Jan.-May 1926
Germany	72.0	60.0	52.50	47.9
Switzerland	13.0	28.0	28.18	36.2
France	3.0	1.0	3.46	4.4
England	4.0	3.0	5.32	4.0
Belgium	3.0	5.5	5.98	4.1
Canada	2.0	0.5	2.66	1.0
Italy	2.5	1.0	1.76	1.8
Netherlands	0.5	1.0	0.14	0.6

Imports of Synthetic Dyes

1927—	Pounds	Invoice Value
January	196,620	$186,387
February	312,277	262,364
March	404,714	352,414
April	402,783	323,732
May	349,476	265,752
Total	1,665,870	$1,390,649
1926—		
January	300,441	$283,635
February	369,045	377,638
March	487,804	435,891
April	437,526	401,606
May	392,739	343,745
Total	1,987,555	$1,842,515

Five Leading Dyes, by Quantity, Imported During May

	Pounds
Vat Blue GCD (single strength)	17,560

Helindone Printing Black RD Paste	12,500
Vat Brown R (single strength)	12,361
Vat Olive R (single strength)	10,654
Brilliant Indigo 4B Paste	10,321

Dyes and Intermediates Remaining in Bonded Customs Warehouse

	Dyes and Colors (pounds)	Intermediates (pounds)
December 31, 1926	360,488	562,536
January 31, 1927	615,542	647,692
February 28, 1927	896,059	719,055
March 31, 1927	869,963	712,617
April 30, 1927	1,125,983	827,260

Imports of Color Lakes

	Pounds	Invoice Value
January	1,000	$731
February	....	....
March	4,868	3,241
April	2,011	1,674
May	1,631	1,194

The dyes in this report are grouped by both Colour Index and Schultz numbers, and, in the case of those which could not be identified by either number, the classification according to the ordinary method of application was adopted. As the pastes and powders of the vat dyes vary widely in strength and quantity, each vat dye has been reduced—in nearly every case—to a single strength basis.

DYES OF COAL-TAR ORIGIN

Col. Index No.	Schultz No.	Name of Dye and Mfr.	Quantity (pounds)
10	7	Naphthol Yellow SXX—(TM)	55
70	—	Rapid Fast Red GL Paste—(IG)	2,025
104	—	Metachrome Olive Brown G Powder—(Bro.)	500
127	118	Brilliant Geranine B—(By)	100
150	144	Orange S—(IG)	220
172	159	Acid Alizarine Black R—(S)	2,000
206	185	Anthracene Chrome Black FE—(Q)	2
224	193	Stanley Red—(CAC)	110
288	256	Sulphoncyanine G—(IG)	1,000
316	273	Blue NA—(IG)	
		Diamineral Blue B—(Q)	501
319	—	Direct (Benzo) Fast Heliotrope 2RL—(By)	330
325	—	Diamine Fast Violet FFBN—(IG)	600
326	279	Benzo Fast Orange WS—(IG)	100
341	291	Azo Alizarine Bordeaux W—(DH)	55
346	296	Cotton Yellow G Extra—(IG)	100
349	—	Chlorantine Fast Yellow 4GL—(I)	2,204
357	300	Brilliant Carmine L Conc.—(IG)	200
382	319	Chloramine Red B—(S)	
		Chloramine Red 3B—(S)	4,000
409	339	Diamine Orange B—(IG)	1,500
436	358	Chloramine Red 8BS—(By)	500
487	400	Brilliant Milling Red R—(IG)	500
518	424	Diamine Sky Blue FF—(IG)	200
590	471	Chloramine Blue 3G Conc.—(S)	3,000
591	472	Chloramine Blue HW—(S)	1,500
639	22	Xylene Light Yellow 2G—(S)	1,200
658	496	Rhoduline Blue 6G—(IG)	
		Setoglaucine Conc.—(G)	1,501
667	503	Poseidon Green SGX—(IG)	550
671	506	Erioglaucine AP—(G)	7,372
677	512	Magenta AB Powder—(IG)	
		Diamond Magenta I—(IG)	1,125
680	515	Methyl Violet NFB—(IG)	500
681	516	Crystal Violet Extra Powder—(IG)	500
690	522	Victoria Blue 4R Highly Conc.—(IG)	390
691	523	Fast Green Extra Blue Shade Conc.—(IG)	1,950
712	543	Patent Blue V—(IG)	
		Poseidon Blue BGX Conc.—(IG)	3,500
714	545	Brilliant Acid Blue A—(IG)	
		Poseidon Blue BR Extra—(IG)	
		Poseidon Blue BXX—(IG)	2,552
715	546	Cyanol Extra—(C)	275
729	559	Basic Pure Blue BO—(B)	
		Victoria Pure Blue BO—(IG)	931
735	564	Naphthalene Green V—(M)	
		Poseidon Green VGGX—(IG)	589
743	570	Rhodamine S—(IG)	50
773	592	Erytheosine Extra—(IG)	50
787	—	Coriphosphine OX Extra—(IG)	200
793	606	Phosphine O—(IG)	
		Phosphine 3R—(IG)	1,428
795	607	Runic AL Conc.—(IG)	500
797	608	Patent Phosphine RRDX—(IG)	1,000
815	618	Basic Yellow T—(IG)	
		Tannoflavine TR—(S)	685
833	—	Wool Fast Blue GL—(IG)	270
851	690	Diphene Blue B—(IG)	500
873	681	Direct Gray R Paste—(G)	474
875	923	Fur Yellow Brown A—(IG)	
		Fuscamine G—(IG)	
		Nako PS—(IG)	760
879	—	Chromazurine G—(DH)	441
884	627	Anthracyanine S—(DH)	
		Gallo Navy Blue S—(IG)	420
905	645	Gallazine No. 90—(DH)	220
913	653	Danubia Blue BX—(IG)	250
926	661	Thionine Blue GC—(IG)	500
927	663	New Methylene Blue N—(IG)	500
1006	746	Pyrogene Green 3G—(I)	220
1019	774	Alizarine Black S Paste—(IG)	955
1027	778	Alizarine Red IB Extra Paste—(By)	
		Alizarine Red VI Extra Pure Paste—(IG)	
		Alizarine Red VI Old Paste—(IG)	7,916
1033	779	Alizarine Orange A Paste—(IG)	
		Alizarine Orange AO Paste—(BDC)	
		Alizarine Orange SW Powder (s. s.)—(IG)	3,979
1034	780	Alizarine Red IWS Powder—(M)	
		Alizarine Red S Powder—(Q)	1,560
1039	785	Alizarine Red XGD Paste—(IG)	884
1053	—	Alizarine Light Blue SE Conc.—(S)	500
1056	—	Alizarine Emeraldole Green G—(IG)	10
1060	801	Anthracene Blue SWGG Extra—(IG)	100
1063	790	Anthracene Blue SWR Powder—(IG)	200
1064	—	Alizarine Cyclamine R Paste—(IG)	3,970
1067	804	Alizarine Blue S Powder—(IG)	1,608
1071	808	Alizarine Green S Paste—(IG)	443
1075	856	Alizarine Astrol B Powder—(IG)	533
1076	859	Alizarine Direct Blue RXO Powder—(IG)	100
1077	860	Alizarine Direct Blue BGAOO—(IG)	200
1084	854	Alizarine Viridine FF Paste—(IG)	
		Alizarine Viridine FF Powder (s. s.)—(IG)	2,588

Col. Index No.	Schultz No.	Name of Dye and Mfr.	Quantity (pounds)
1085	862	Alizarine Blue Black B Powder—(IG) Chrome Blue Black B—(I)	951
1087	851	Alizarine Direct Blue B—(IG)	80
1088	855	Alizarine Sky Blue B—(By) Alizarine Sky Blue B—(IG)	2,354
1089	861	Anthraquinone Blue SR Extra Pdr.—(IG)	100
1091	—	Alizarine Rubine R Powder—(By) Anthra Rubine B—(K)	289
1092	—	Alizarine Geranole B Powder—(IG)	250
1095	759	Anthra Yellow GC Paste—(IG) Anthra Yellow GC Obl. Pst. (s. s.)—(B) Anthra Yellow GC Pdr. (s. s.)—(IG)	4,599
1096	760	Vat Golden Orange G Dbl. Pst. (s. s.)—(IG) Vat Golden Orange G Pdr. (s. s.)—(B)	2,278
1097	761	Vat Orange RRT Paste—(IG) Vat Orange RRT Paste Fine—(IG)	6,697
1099	763	Vat Dark Blue BOA Paste—(B) Vat Dark Blue BOA Paste Fine—(IG) Vat Dark Blue BOA Powder (s. s.)—(IG)	4,238
1102	765	Vat Black BB Dbl. Pst. (s. s.)—(IG) Vat Black BB Powder (s. s.)—(IG)	5,098
1104	767	Vat Brilliant Violet RR Paste Fine—(IG)	2,627
1109	840	Vat Blue 3G Powder (s. s.)—(IG)	500
1113	842	Vat Blue GCD Dbl. Pst. (s. s.)—(IG) Vat Blue GCD Dbl. Pst. Fine (s. s.)—(IG) Vat Blue GCD Dbl. Pst. Fine—(B) Vat Blue GCDN Pdr. (s. s.)—(IG)	17,560
1115	843	Cibanone Blue G Paste—(I) Cibanone Blue G Powder (s. s.)—(I)	2,757
1118	849	Vat Yellow G Dbl. Pst. (s. s.)—(IG) Vat Yellow G Pdr. (s. s.)—(IG)	3,774
1120	867	Anthra Brown B Paste—(IG)	858
1128	818	Algol Pink R Powder (s. s.)—(IG)	800
1128	817	Algol Yellow GK Powder (s. s.)—(By)	800
1133	819	Algol Red R Extra Powder (s. s.)—(IG)	1,600
1135	820	Vat Brilliant Violet RK Paste—(IG) Vat Brilliant Violet RK Pdr. (s. s.)—(IG)	1,400
1136	822	Vat Orange RRK Paste—(By)	1,197
1149	873	Vat Brown GR Powder (s. s.)—(IG)	250
1150	833	Grelanone Olive B Pdr. (s. s.)—(GrE) Vat Olive B Paste—(GrE) Vat Olive R Paste—(IG) Vat Olive R Powder (s. s.)—(IG)	10,654
1151	—	Grelanone Brown RR Powder (s. s.)—(GrE) Vat Brown R Paste—(IG) Vat Brown R Paste—(By) Vat Brown R Powder (s. s.)—(IG)	12,361
1152	—	Vat Brown G Paste—(IG) Vat Brown G Powder (s. s.)—(By)	4,024
1162	831	Vat Red RK Paste Fine—(IG) Vat Red RK Powder (s. s.)—(IG)	1,500
1163	832	Vat Violet BN Paste—(IG) Vat Violet BN Paste Fine—(IG) Vat Violet BN Paste Powder (s. s.)—(IG)	3,351
1184	881	Brilliant Indigo 4B Paste Fine—(IG)	10,321
1188	884	Brilliant Indigo BB Paste—(IG)	489
1189	887	Brilliant Indigo 4G Paste Fine—(IG)	1,027
1190	885	Brilliant Indigo B Paste—(IG)	5,045
1202	893	Alizarine Indigo G Paste—(IG)	794
1207	912	Anthra Red B Paste Fine—(IG)	988
1211	910	Helindone Pink AN Paste—(IG) Helindone Pink BN Paste—(IG) Helindone Pink BN Paste—(M)	3,441
1212	918	Vat Red Violet RH Paste Fine—(IG) Vat Red Violet RH Powder (s. s.)—(IG)	8,250
1217	913	Hydron Orange RF Paste—(IG) Vat Orange R Powder (s. s.)—(M)	2,140
1228	907	Anthra Scarlet 2G Paste—(B) Helindone Fast Scarlet C Paste—(IG)	1,623

UNIDENTIFIED DYES

Acid Dyes

Name of Dye and Manufacturer	Quantity (pounds)
Acid Black 2R—(IG)	8,923
Azo Alizarine Carmoisine—(DH)	77
Acid Milling Yellow G Conc.—(S)	1,000
Alizarine Direct Blue A2G—(IG)	200
Alizarine Direct Blue RBX—(IG)	50
Alkali Fast Green 10G—(IG)	392
Amido Black Green B—(IG)	100
Brilliant Milling Blue B—(IG)	800
Brilliant Wool Blue FFR Extra—(By) Brilliant Wool Blue FFR Extra—(IG)	1,875
Cloth Fast Yellow G—(I)	331
Guinea Fast Green B—(IG)	500
Indigo Carmine Blue FF—(IG)	100
Indocyanine B Powder—(A)	440
Milling Orange G—(IG)	700
Milling Yellow O—(IG)	500
Neolan Bordeaux R—(I)	99
Neolan Violet Brown B—(I)	110
Onis B—(IG)	200
Pilatus Fast Blue GG—(IG)	200
Selan Printing Brown 3R—(By)	100
Silk Yellow R—(IG)	150
Sulpho Rosazeine G—(M)	33
Sulphon Yellow 5G—(IG)	200
Sulphon Yellow R—(IG)	300
Supramine Blue FB—(IG)	100
Supramine Blue R—(IG)	100
Supramine Bordeaux B—(IG)	200
Supramine Brown G—(IG)	300
Supramine Brown R—(IG)	100
Supramine Red B—(IG)	200
Supramine Red 2G—(IG)	200
Wool Blue 5B F.F.S.—(IG)	200
Xylene Milling Orange R Conc.—(S)	500

Vat Dyes

Alizarine Indigo 5R Paste—(IG)	1,000
Anthra Orange RH Paste Fine—(IG)	1,000
Anthra Pink B Extra Paste—(IG)	1,000
Anthra Pink R Extra Paste Fine—(IG)	1,000
Anthra Scarlet B Paste—(IG) Anthra Scarlet B Powder (s. s.)—(IG)	2,100
Ciba Pink BG Paste—(I)	2,205
Cibanone Orange 6R Paste—(I)	110
Cibanone Red B Powder (s. s.)—(I)	550
Eridan Brilliant Scarlet B Paste—(IG)	250
Grelanone Red 3BR Paste—(GrE)	1,102
Helindone Blue B Paste—(IG)	100
Helindone Fast Scarlet G Paste—(IG)	300
Helindone Printing Black RD Paste—(IG)	12,500
Helindone Yellow IFFRK Powder (s. s.)—(IG)	400
Hydron Brown G Paste—(IG)	1,044
Hydron Pink FF Paste—(IG)	2,500
Hydron Violet R Powder (s. s.)—(IG)	250
Hydron Yellow GG Powder (s. s.)—(IG)	600
Indigosol O4B—(IG)	200

Name of Dye and Manufacturer	Quantity (pounds)
Indigosol Pink HR Extra—(IG)	25
Indigosol Scarlet HB—(DH)	55
Indigosol Yellow HCG—(IG)	50
Vat Blue RSN Powder—(IG)	9
Vat Blue RZ Double Paste (s. s.)—(IG)	4,968
Vat Brilliant Blue R Paste—(B)	
Vat Brilliant Blue R Paste Fine—(IG)	859
Vat Golden Orange 3G Paste—(IG)	794
Vat Golden Yellow GK Double Paste Fine (s. s.)—(IG)	1,000
Vat Gray RHH Paste Fine—(IG)	689
Vat Green GG Double Paste (s. s.)—(IG)	
Vat Green GG Double Paste (s. s.)—(B)	
Vat Green GG Powder (s. s.)—(IG)	5,354
Vat Khaki GG Paste—(IG)	960
Vat Orange 3R Paste Fine—(IG)	1,978
Vat Orange 4R Powder (s. s.)—(IG)	1,500
Vat Pink B Double Paste—(IG)	4,484
Vat Printing Black BR Paste—(By)	220
Vat Printing Brown R Paste—(By)	
Vat Printing Brown R Paste—(IG)	5,260
Vat Red BK Paste Fine—(IG)	397
Vat Red 2G Paste—(IG)	
Vat Red 2G Paste—(B)	1,849
Vat (Hydron) Scarlet 3B Paste—(C)	
Vat (Hydron) Scarlet 3B Powder (s. s.)—(C)	1,760

Mordant and Chrome Dyes

Acid Alizarine Gray G—(IG)	672
Acid Anthracene Brown PG—(By)	661
Acid Anthracene Red 5BL—(IG)	100
Acid Chrome Red B—(IG)	100
Alizarine Brown HD Paste—(IG)	300
Alizarine Fast Black SP Paste—(IG)	300
Anthracene Acid Black SASG—(Q)	2
Anthracene Acid Black SRT—(Q)	2
Anthracene Chromate Brown EB—(IG)	500
Anthracene Chrome Black KLT, P C—(Q)	4
Anthracene Chrome Black PF, PPS, PT—(Q)	6
Autochrome Gray G—(M)	364
Chrome Fast Xanthine 2R—(DH)	220
Chrome Green GR—(DH)	55
Chrome Printing Red B—(DH)	220
Chrome Printing Red Y—(DH)	441
Chrome Violet CBD—(DH)	110
Chromocitronine 3R—(DH)	220
Chromorhodine 6GN Extra—(DH)	220
Chromoxane Pure Blue B—(IG)	500
Erio Anthracene Brown R—(G)	220
Eriochromal Brown AEB—(G)	55
Eriochrome Brown SWN Supra—(G)	220
Eriochrome Red G—(G)	1,102
Metachrome Blue Black 2BX—(IG)	2,000
Metachrome Brilliant Blue 8RL—(IG)	100
Omega Chrome Brown EB—(S)	1,000
Ultra Cyanol B Conc.—(S)	500

Direct Dyes

Benzo Chrome Blue Black B—(IG)	50
Benzo Fast Blue 8GL—(IG)	200
Benzo Fast Brown RL—(IG)	500
Benzo Fast Gray BL—(IG)	500
Benzo Fast Heliotrope 4BL—(By)	550
Benzo Fast Light Scarlet 4BL—(IG)	100
Benzo Fast Yellow RL—(By)	500
Benzo Rhoduline Red 3B—(IG)	200
Brilliant Benzo Green B—(IG)	500

Name of Dye and Manufacturer	Quantity (pounds)
Brilliant Congo Blue 5R—(IG)	200
Brilliant Fast Blue 3BX—(IG)	500
Brilliant Pure Yellow 6G Extra—(IG)	
Brilliant Pure Yellow 6G Extra—(By)	851
Brilliant Sky Blue 8G Extra—(IG)	
Brilliant Sky Blue 8G Extra—(By)	1,315
Brilliant Sky Blue R—(IG)	300
Brilliant Sky Blue 2RM—(IG)	200
Chlorantine Fast Blue 2GL—(I)	2,204
Chlorantine Fast Brown BRL—(I)	661
Chlorantine Fast Orange 2RL—(I)	551
Chlorazol Drab RH—(BDC)	200
Chlorazol Fast Orange AG—(BDC)	200
Columbia Catechine 3B—(IG)	100
Columbia Catechine G—(IG)	500
Developing Blue 4R—(IG)	300
Diamine Brilliant Scarlet S—(IG)	
Diamine Brilliant Scarlet S—(C)	1,602
Diamine Catechine B—(IG)	200
Diamine Fast Brown R—(IG)	200
Diamine Fast Orange EG—(IG)	1,600
Diamine Fast Orange ER—(IG)	500
Dianil Fast Violet BL—(IG)	200
Diazo Brilliant Orange 5G Extra—(IG)	200
Diazo Brown 6G—(IG)	400
Diazo Brown 3R—(IG)	200
Diazo Fast Blue 2BW—(I)	220
Diazo Fast Violet 3RL—(By)	110
Diazo Indigo Blue 4GL Extra—(IG)	496
Diazo Indigo Blue R—(IG)	100
Diazo Indigo Blue 2RL—(IG)	300
Diazo Sky Blue B—(IG)	1,951
Diphenyl Fast Bordeaux BC—(G)	110
Direct Brilliant Blue 6BR—(I)	110
Direct Safranine RW—(I)	110
Fast Cotton Brown 4RL—(IG)	100
Fast Cotton Gray BL—(IG)	100
Fast Cotton Gray GL—(IG)	50
Fast Cotton Gray VL—(IG)	500
Fast Cotton Yellow RL—(Q)	304
Minaxo Black BBNX—(IG)	100
Minaxo Blue 4BX—(IG)	200
Parasulphon Brown V—(S)	650
Pluto Brown 2G—(IG)	200
Rosanthrene 3BN—(I)	110
Rosanthrene Bordeaux B—(I)	551
Rosanthrene Orange R—(I)	1,102
Trisulphon Bronze BG Conc.—(S)	500
Zambesi Brown 4R—(IG)	200
Zambesi Pink B Extra—(A)	421

Dyes for Artificial Silk

Cellitazol SR—(IG)	100
Cibacete Yellow 3G Paste—(I)	220
Duranol Blue G Paste—(BDC)	2,452
Duranol Brilliant Blue G Paste—(BDC)	60
Duranol Orange G Paste—(BDC)	106
Duranol Red G Paste—(BDC)	212
Ionamine A—(BDC)	200
Pink R Extra Paste—(IG)	50

Rapid Fast Dyes

Rapid Fast Orange RG Paste—(IG)	1,500
Rapid Fast Red LB Paste—(IG)	400
Rapid Fast Red GZ Paste—(IG)	1,000

Basic Dyes

Name of Dye and Manufacturer	Quantity (pounds)
Acridine Flavine R—(DH)	220
Astra Phloxine FF Extra—(IG)	290
Brilliant Acridine Orange 3R—(DH)	220
Rhodamine 6GDN Extra (s. s.)—(IG)	2,000
Rhodamine 6GH Extra (s. s.)—(S)	1,000

Sulphur Dyes

Immedial Brown W Conc.—(IG)	1,000
Immedial Cutch O—(Q)	1
Immedial Yellow Olive 5G—(IG)	100
Indocarbon CL—(IG)	1,000
Indocarbon CL Conc.—(IG)	2,150
Indocarbon SN—(IG)	
Indocarbon SN—(Q)	501
Pyrogene Brown G—(I)	110
Pyrogene Cutch 2R Extra—(I)	220
Sulphide New Blue GL—(IG)	500
Sulphide Violet V—(IG)	300
Sulphide Brown CL/4R—(IG)	500
Thinol Green B—(BDC)	1,022
Thionol Yellow GR—(BDC)	5,229

Color-Lake and Spirit-Soluble Dyes

Alizarine Astrol Powder (Oil Soluble)—(IG)	500
Hansa Yellow G Lumps—(IG)	100
Hansa Yellow G Paste—(IG)	500
Helio Bordeaux BL Paste—(IG)	
Helio Bordeaux BL Powder (s. s.)—(IG)	4,456
Helio Red RMT Extra Powder—(IG)	350
Oil Green ALB Lumps—(IG)	100
Stone Rubine BN Powder—(IG)	250
Tero Black FB—(IG)	100

Unclassified Dyes

Icyl Blue G—(BDC)	114
Icyl Blue Black 6B—(BDC)	114
Icyl Orange G—(BDC)	114
Icyl Violet B—(BDC)	114

LIST OF APPRAISEMENTS OF COAL-TAR PRODUCTS WITHIN PARAGRAPHS 27 AND 28 OF THE TARIFF ACT OF 1922

The following supplemental list contains the month of entry, the name of the product within paragraphs 27 and 28, together with the designations as "C" (for competitive) and "NC" (for non-competitive), which indicates the appraisement basis for the assessment of the ad valorem duty in paragraphs 27 and 28 of the Tariff Act of 1922.

The ad valorem rate for competitive dyes is based on the American selling price, as defined in Subdivision (f) of Section 402 of Title IV; the ad valorem rate for non-competitive dyes is based on the United States value, as defined in Subdivision (d) of Section 402 of Title IV of the Tariff Act of 1922.

This list contains the appraisements received since the publication of the March list for the Port of New York, beginning with January, 1927:

JANUARY

Brilliant Acridine Orange A	NC
Chloramine Fast Orange G Conc	C
Developed Brilliant Green 3G	NC
Diazamine Blue BR Conc	C
Sandothene Yellow NC Double Paste	C
Thional Brilliant Green GG Conc	C
Vat Red RK Paste	C

FEBRUARY

Chloramine Fast Orange R Conc	C
Diazamine Blue BR Conc	C
Tanno Flavine T	C
Trisulphon Brown B Conc	C
Vat Brilliant Blue R Paste	C
Xylene Light Yellow 2G	C

MARCH

Madder Lake Powder	C
Madder Lake 72 Powder	C
Madder Lake 79 Extra Powder	C
Madder Lake VN 14 Powder	C
Red Ponceau R	NC
Viridine Lake 1026 H Powder	C

PRACTICAL HINTS ON THE PRODUCTION OF BRIGHT COLORS

(*Continued from page* 410)

ing its way into the waste water main, or elsewhere where may be convenient.

The material is then observed to control its thickness and construction, fixing the speed at which the plant is to be run, and the end of the first piece is sewn to the end of the two tapes already entered in the machine, while its other end is joined to a chain of other pieces, placing the lot on table A ready for starting work with the least possible loss of time.

In the meanwhile, another operative prepares the first vat which has to conduct the topping operations on the dyed cloth, and brings it on platform Z, which has been lowered for the purpose, applying hydraulic pressure to piston L, to cause the platform to mount again. In this way the first wagon of topping bath is placed in position below bars C, and the plant can be placed in movement.

The dyed cotton material thus mounts on frame E, where it is smoothed; an operative assisting at first the action of bars a, b, c, d, e and f by clutching the cloth at its borders and keeping it under a slight tension. As the material passes on the bars, the repeated action of these applies to it a certain tension, the degree of which is arranged by raising or lowering the end-shafts of roller g, which are also under the action of side-springs.

From roller g, the goods then descends in the topping bath in contact with the guide rollers on cage H, and while making a zig-zag course is acted upon by the topping bath, taking up the desired degree of coloration before passing between the squeeze rollers G, which press out all excess of bath, causing it to fall back into the dye vat itself, through the action of a lower collection trough.

On leaving the rollers, the material descends to the double series of guide rollers m and n, which bring it continually up and down in the rapidly circulated cold running water, eliminating all excess dyestuff and giving greater clearance to the shade produced. On reaching squeeze H, these have therefore to eliminate nearly colorless water, especially if basic colors have been used in the first treatment that are easily absorbed by the material.

On leaving rollers H, the wet cotton cloth contains

only a small quantity of water uniformly distributed throughout, and is taken up by rollers O which just hold it with only a slight pressure; and deliver it to the swinging folder P, which deposits it on table B under conditions for forming pieces, the width of which can be regulated at pleasure by raising or lowering a side-rod working on an upper disc, both of which control the motion of the appliance itself.

The dyed and topped cotton cloth making its way through the plaiter P is then examined, and occasionally taken up for comparison with a sample to ascertain if the topping operations are proceeding all right; a small sample being cut near one of the borders if there is evidence that the treatment is not proceeding to the desired degree.

If the lot being treated is large, after a time the topping bath in the treating trough will be too weak to produce the desired strength of color, and in this case, or where the color has to be changed, two cotton tapes of some length are sewn to the end of a given number of pieces which are allowed to run through with the cloth. During their passage forward, and just when they are only running on all the guide rollers of cage H, the exhausted bath is lowered by the assistance of platform Z, and a fresh bath of exactly the same strength, in another dyeing trough, is raised in its place.

Meanwhile, at the end of the two cotton tapes is sewn the end of the first piece of the new lot of dyed cloth, and this now makes its way through the fresh topping bath. The change of vat H is repeated as long as work is performed on the plant. This is stopped when the last lot has been completed, fixing at the end of the last yards of cloth the two cotton tapes which thus remain in the plant, and need not be introduced when this is next worked.

The small wagons containing the old dye baths are collected in one of the rooms already indicated. If the same color is being used for the topping, the contents of only one of the baths is reinforced and replaced for use while the rest are left in deposit for later use.

Two assistants are engaged in this instance to enter the dyed cotton goods on table A and sew the end of the new pieces to the end of those just entered or to be entered, besides discharging the topped material from table B onto hand trucks ready for delivering to the drying room, after having unsewn their fixed ends.

Features of the Plant

The plant illustrated by Fig. 2 possesses several marked advantages, some of which can be indicated as follows:

1. The material is treated very rapidly with more or less strong baths of the basic color, which are not exhausted, but are just allowed the time to be fixed in part on the material.

2. The percentage of color fixed on the fabrics previously dyed in sulphur colors is regulated by the speed at which the plant is run, the intensity with which the material absorbs the basic dyestuffs, and concentration of the latter.

3. The same basic dyestuff can be used for topping very large quantities of material dyed in one, two or more colors, using only two-color wagons, and reinforcing the same topping baths repeatedly.

4. Every wagon can be charged with a different basic color if needs be, and its size can be regulated for the topping of twenty or more pieces, one after the other, without requiring intermediate reinforcement, always leaving in this case, however, a bath containing sufficient dye to perform the correct topping of a certain number of yards of the dyed cotton cloth.

5. Basic dyes, more difficultly absorbed by the sulphur color present in the cotton cloth, can be used to advantage, continuing the topping on a continuous bath.

6. The production of the plant is large, owing to the necessity of quickening the speed of passage through the different topping baths.

7. The size of the topping color wagons allows always a thorough penetration of the goods.

8. By placing on the small wagons wooden covers of suitable construction and weight the old baths can be preserved for quite a long period.

9. The topping operations can be performed with or without acetic acid.

10. Through the action of squeeze rollers G, and the return of all pressed-out liquid to the original bath, a very small quantity of the basic coloring matters is lost.

Topping with Sulphate of Alumina

The high price and great volatility of acetic acid have caused some dyers to replace it, when topping cotton goods dyed with sulphur colors, with a corresponding quantity of ordinary alum or of the cheaper sulphate of alumina. The topping process works in this instance quite satisfactorily, and the slight complication brought about through the necessity of dissolving each time the alum or sulphate of alumina, brings no difficulty through the great amount of water contained in the crystals of both products.

If the fabrics are properly freed, after the dyeing in the sulphur colors, from all traces of the dye bath, the topping solution used receives little change, and can be employed for some time.

In this way the addition of aluminum salt required for each new lot of material treated is not large, and reduces further the cost of the process.

(*To be continued*)

Stephen Waterman, who comes from Providence, R. I., has been appointed overseer of finishing at the Arlington Mills to succeed Frank P. Gallagher. Mr. Gallagher, who is well known in the National Association of Woolen and Worsted Overseers, of which he was at one time the president, has held this position for over twelve years.

AMERICAN
DYESTUFF REPORTER

Devoted to the use and application of dyestuffs and the mechanical equipment incidental thereto

LOUIS A. OLNEY
PROFESSOR OF CHEMISTRY AND DYEING, LOWELL TEXTILE SCHOOL
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THE A. A. T. C. C. APPOINTS A RESEARCH ASSOCIATE

MORE constructive technical research on dyeing and textile chemistry has been set in motion in this country during the past five years than in all the preceding quarter-century. Several important branches of this research have been advanced by the intensive studies undertaken by the American Association of Textile Chemists and Colorists. The Research Committee of the Association, quietly and systematically following a sensible plan, has laid the groundwork for some years of future research on the fastness of dyes and related problems. So fruitful has been its preliminary efforts that the Association has now appointed a regular Research Associate to assist in carrying on further studies at the Bureau of Standards in Washington. Formal notice of the appointment appears in the Proceedings in this issue.

With the establishment of more intimate contact with the Bureau of Standards laboratories, the work of the Research Committee of the A. A. T. C. C. enters upon a new and most promising stage. The committee's principal project, a series of exhaustive tests for the purpose of standardizing the fastness of dyes, has been generously aided during the past few years by one of the Bureau's chemists, and during last summer the Association had a second research assistant engaged at the Bureau laboratories. But this assistance, though capably rendered and of utmost value in advancing the project, lacked the continuity so essential in scientific studies of any kind. A Bureau chemist, of course, can devote only a limited time to co-operating with the various research associates established at the Government laboratories by trade and technical groups. The new associate appointed by the A. A. T. C. C., on the other hand, has been engaged under yearly contract to give his entire time to the Association's research work on dye application and textile chemistry, and will consequently be able to develop more rapidly the special phases of this work assigned to him by the Research Committee. His operations will be supervised by the committee, to which he will regularly report so that the progress of his studies will be definitely marked.

The planning of its various research projects has given the Association but little difficulty; its well-organized subcommittees have simplified that task. But to find the means to carry out the plans has been a problem. Beautiful though theories and projects may appear in the abstract they produce nothing until put into practice. What laboratory facilities were available were of little use without someone to perform the actual work covered by the plan. That noteworthy results have been achieved in spite of this handicap clearly shows that the Research Committee of the Association is actuated by a dogged determination to move forward continuously even though slowly.

This spirit should stand as an inspiration for the new Research Associate. When he enters upon his duties at the Bureau of Standards he will find a sturdy framework already erected upon which he will assist in building the walls. He will probably be engaged at first in completing the work of standardizing the fastness tests and classifying dyestuffs according to these tests. One of the important projects planned by the Association is the establishment of a service for distributing dyed samples based on these fastness standards. In this standardization work it will co-operate with the British Society of Dyers and Colourists.

The bare record of what has been accomplished by other industrial technical groups through systematic research carried on by associates at the Bureau of Standards lends to the future plans of the A. A. T. C. C. a most auspicious outlook. Textile research is ably represented at the Bureau by associates of three other textile trade groups. The National Association of Hosiery and Underwear Manufacturers has long reaped immeasurable benefits through the work of its own research associate who is engaged in the study of such practical subjects as the moisture content of carded and combed yarns and the standardization of twist with respect to dye application. The Association of Knit Underwear Manufacturers also has a technical man at the Bureau. The notable work performed by the associates supported by the National Association of Dyers and Cleaners is well known to readers of the REPORTER.

The urgent need of a Bureau associate to represent its investigations in dye application and textile chemistry has long been recognized by the A. A. T. C. C., but not until this year has it been possible to appoint one. Its research results will now carry with them the prestige of the United States Government; more specifically the prestige of one of the world's most imposing agencies for industrial research. Under the Bureau's associate plan unsurpassed facilities for technical research are made available to the industries of the country at a moderate cost, paid out of the funds of trade and technical groups. The counsel of a staff of experts, the in-

valuable privilege of attending meetings of scientific groups held under the auspices of the Bureau, use of the most complete laboratory facilities and equipment—these and numerous other advantages are now enlisted to advance the research projects of the A. A. T. C. C., which in turn, through its members, will pass on the benefits to the entire textile industry.

ANNUAL CAUTION

ALTHOUGH textile manufacturering is not markedly hazardous work, there is every reason for continually maintaining the interest of mill employees in accident prevention. Workers accustomed to handling dangerous materials and machinery day after day tend in time to relax the instinctive care with which nature safeguards us humans, until a mishap brings swift and painful injury and vividly warns of the danger that lies in laxity.

The ordinary safety campaign fails as an effective check on human carelessness in industry. A safety speaker addresses a meeting of the workers' council, perhaps, and a few committees are enthusiastically formed to keep down the accident records of each department of the mill and spread safety education among their fellow workers. Posters and a time-loss chart are tacked on the bulletin board, and for a few weeks there is friendly rivalry among the departments for the honor of recording the fewest accidents. But for a time no one is injured, interest soon wanes, and the great god Carelessness resets his traps for the next victim. Why should industrial safety mean a brief annual display of caution when accidents can happen every day in the year?

FEDERAL COMMERCE BUREAU NEEDS MEN

Openings for young college men are offered by the Bureau of Foreign and Domestic Commerce. The bureau's service to the commerce of the United States takes its representatives abroad as well as to various parts of this country. Examination for such a position, it is understood, is of general character and should offer no difficulties to the average young man of good education.

Men who have had business experience in the chemical industry or even scholastic training in chemistry are needed by the Chemical Division of the bureau, according to its chief, C. C. Concannon. He states that he is extremely anxious to enlist into the service of the division as many young men as possible, for by doing so, he believes, the service which the bureau as a whole and the Chemical Division is rendering to the chemical industry can be improved.

"There is, of course, no laboratory work connected with any appointments that might result from the examination," Mr. Concannon advises. "The work is entirely of a commercial character and our efforts are devoted primarily to developing sales of American products in foreign lands."

WAR DEPARTMENT PLANS REDYEING OF OLD UNIFORMS

For several years a quantity of cotton uniforms, a part of the war stock, have been stored at various army posts. Their shade, once khaki, has through long storage assumed various and indefinable tints and hues. Under the direction of the Quartermaster-General's office experiments are being conducted to develop a method of decolorizing these uniforms in order that they may be redyed to standard shade with faster colors. Field tests are also being made on new cotton uniform cloth, claimed to be of fast color.

A company of infantry at Fort Benning, Ga., has been equipped with uniforms made of this cloth, to be worn during the summer and given wear under service conditions. A company of infantry is to be similarly equipped in Panama. Final result of these tests will furnish the War Department with data to definitely determine the final disposition of war stocks of cotton uniforms.

CHEMICAL MICROSCOPY AT CORNELL

A course in Chemical Microscopy will be given by the Department of Chemistry of Cornell University during the coming summer session.

The introductory course will cover the use of the microscope and its accessories, microscopic measurements and quantitative methods, crystal studies, micro-manipulation, refractive index determinations, and examination of textile and paper fibers. A course in microscopic qualitative analysis including the reactions of the commoner metals and acids will also be given. Both of these courses will be the full equivalent of those given during the regular college year; they may be taken separately or together, or other work in the Department may be carried on, according to the needs of the student.

The Summer Session opens July 5 and continues for six weeks, but persons not desiring university credit may arrange to cover, in a shorter period, those portions of the work most suited to their special needs. Any inquiries should be addressed to Dr. C. W. Mason, who will have charge of the courses.

COLLOID CHEMISTRY WORK OFFERED FOR SUMMER

During three days last week the Fifth National Colloid Chemistry Symposium was held at the University of Michigan, Ann Arbor. Prof. H. R. Kruyt was the guest of honor and will remain at the university for the summer session, which begins June 27. The chemistry department of the University of Michigan has arranged special lectures, laboratory, seminar and research courses which will make it possible for one to carry on intensive work in colloid chemistry under the direction of Professors Kruyt and Bartell.

CAROLINA COLLEGE TEXTILE SCHOOL HOLDS INTERESTING COMMENCEMENT

The graduates of the class of '27 of the North Carolina State College Textile School came from the Carolinas, Georgia, Alabama, Massachusetts, Honolulu and China, comprising what can be described most fittingly as an international cross-section of textile students. Nineteen of these young men received degrees of bachelor of science, and one was awarded the degree of master of science in textile manufacturing.

Textile students take an important part in the general college activities. During the past year the valedictorian, president of the student body and president of the senior class were textile students. John F. Matheson, who graduated with high honors, was voted the best all-around man in the senior class in the competition put on by the Agromeck, the student year book. For four years out of five the president of the senior class has been a textile student. For three years out of four the valedictorian has been a textile student. Twice during the past four years a textile student has been president of the student body.

John W. Clark, president of Randolph Mills, Franklinville, N. C., and a graduate of the textile school, presented the National Association of Cotton Manufacturers' medal to Frank E. Plummer, of Selma, Ala., valedictorian of the class of 1927. The medal is awarded annually to textile schools of recognized standing which are fully equipped to give instruction in all branches of the industry, and is presented to the student who shows the highest proficiency in his work during his four years in college. This medal has been awarded to students in the Textile School of North Carolina State College for nineteen years.

Every member of the graduating class has been placed in a textile position, and Dean Thomas Nelson stated that many more could have been placed, as the requests for men exceeded the number of textile graduates. The following is the list of men who received degrees:

Bachelor of Science in Textile Chemistry and Dyeing—Stacy Boyd Carson, Taylorsville, N. C.; Albert Harvey Grimshaw, New Bedford, Mass.

Bachelor of Science in Textile Engineering—Frank Tse-jui Chang, China; William Clarence Park, Augusta, Ga.

Bachelor of Science in Textile Manufacturing—Harvey Leighton Brown, Charlotte, N. C.; John Davis Cassada, Littleton, N. C.; Macon Crawford Comer, Greensboro, N. C.; John Henry Dulin, Charlotte, N. C.; Earle Andrew Feimster, Jr., Greensboro, N. C.; James Bright Griffin, Monroe, N. C.; John Leslie James, Star, N. C.; Arthur Cuthbert Jones, Farmville, N. C.; Cecil Ivey Knight, Durham, N. C.; George Ehrhardt Kohn, Mount Holly, N. C.; John Flood Matheson, Cheraw, S. C.; Franz Erion Plummer, Selma, Ala.; David Alexander Purcell, Wentworth, N. C.; Marion Kirk Sanders, Columbia, S. C.; George K. Y. Tom, Honolulu.

RECENT LITERATURE

Directory of Commercial Testing and College Research Laboratories. Bureau of Standards Miscellaneous Publications No. 90. 15 cents.

In accordance with the law the National Bureau of Standards makes tests and carries out investigations for other Government departments. Because of the large amount of this official work, it is impracticable for the bureau to make tests for private individuals if other laboratories can do the work. To inform interested persons of the location of other laboratories, the bureau has compiled a list of the 207 commercial testing laboratories throughout the country, together with indications of the types of commodities which they are prepared to test. Special care has been exercised to make this list complete.

The existence of a thoroughly classified list of testing laboratories will have a number of beneficial effects in promoting the use of specifications, not the least important of which will be the inducement offered to the large number of purchasers who have hitherto hesitated to buy on specifications, because of their inability to determine whether or not commodities delivered correspond to the specification requirements.

To accompany the list of commercial testing laboratories there has been compiled a list of 143 colleges which are used not only for the purposes of instruction, but also to a considerable extent for research work. In fact, many important industrial research problems are being solved in the college laboratories.

FOREIGN SURVEYS OF TEXTILE APPAREL AVAILABLE

Mill men who like to keep informed of trends and changes in textile merchandise in other countries of the world can obtain informative surveys from the Wearing Apparel Section of the Textile Division of the Bureau of Foreign and Domestic Commerce. Surveys for South Africa and for Australia and New Zealand have been issued and one on Cuba is being prepared. These reports are enlightening to anyone interested in exports of wearing apparel. The area, topography and climate of each country, its population, industry and purchasing power and customs and other commercial information are covered in detail. Readers interested in receiving them may have their name added to the mailing list by writing to the Textile Division of the Bureau of Foreign and Domestic Commerce.

The Worth Mills of Fort Worth, Fort Worth, Texas, have been incorporated to take over and operate the Worth Mills. The new company has a capital of $1 200,000. Charles L. Harding, of 777 Franklin Street, Boston, Mass., is president, and D. D. Towers, who has been agent for the mill, is vice-president.

Technical Notes from Foreign Sources

Detecting Abnormal Treatment of Rayon

Determinations such as that of the copper number, breaking strain, etc., do not give reliable indications of the treatment to which a sample of cellulose has been subjected. The following method, which was developed by Weltzien, is shown to yield useful information concerning the previous history of the sample. The dry material is treated with water, then with a 4 per cent solution of sodium hydroxide, then with water again, and is then dried. The percentage change in the fiber length at each stage is determined and the procedure is then repeated on the same sample.

A normal fiber increases to 104 per cent of its original length on treatment with water, shrinks to 103 per cent with a 4 per cent sodium hydroxide solution, increases again to 104 per cent with water, and on drying shrinks to slightly less than its original length. On repetition of the treatment closely similar results are obtained. With a fiber which had previously undergone abnormal mechanical strain by being loaded with a weight of 50 grams, the fiber length after water treatment was 100.5 per cent, after alkali treatment 98.5 per cent, after second water treatment 99.2 per cent, on drying 95.5 per cent of the original.

When the process was repeated, this material gave results which were similar to those of a normal fiber. The effect of abnormal mechanical strain, which may result in a change in the dyeing properties and the luster of the fabric, can thus be corrected by alkaline immersion. A fiber which had undergone abnormal chemical treatment—that is, immersion in 0.48 per cent sulphuric acid solution and dehydration at a temperature of 60 deg. Cent.—gave the following results:

After water treatment the fiber length was 101.5 per cent of the original, after alkali treatment 100.5 per cent, after second water treatment 102 per cent, on drying 94 per cent. A repetition of the procedure gave 106.5 per cent, 106 per cent, 107 per cent and 100 per cent. The effect of acid cannot therefore be counteracted by alkaline treatment, as the immersion results in a fiber which shows abnormally high changes in length with water and sodium hydroxide.

This may be due to the formation with acid of alkali-soluble products which are removed during the first treatment, and the fiber is thus rendered more penetrable. Treatment of the fiber with dilute hydrochloric acid has a similar effect, but acetic acid causes little change. Excessive bleaching results in abnormally high changes in length when the fiber is treated with water and alkali in the manner described above (106 per cent, 105 per cent, 107 per cent and 97 per cent), and still more abnormal results when the process is repeated (108.5 per cent, 108 per cent, 109 per cent and 98.5 per cent). It is therefore claimed that the method not only detects fibers which have undergone severe treatment, but also gives an indication of the conditions to which the sample has been subjected. (Cellulosechemie, 1926, Vol. 7, pp. 166-168.)

Sodium Perborate as Antichlor

When hypochlorites or chlorine liquors are used to bleach textiles and the like, one of the most important conditions of the process is the removal of the excess liquor after it has exerted its bleaching action. This refers particularly to the slight traces that remain after the goods have been well washed. Numerous media are employed for this purpose. The so-called antichlors, such as sodium thiosulphate and sodium perborate, are most active in these reagents.

The reaction of sodium perborate with the hypochlorite results in the formation of sodium borate, salt and the liberation of oxygen. In other words, the perborate compound is reduced. The oxygen is liberated in the nascent stage, hence in the form in which it exerts its most powerful oxidizing action.

The important question, in which the bleacher is much interested, is how rapidly does the perborate act on the hypochlorite and does the reaction go to completion, for on the answers to these questions depends whether or not this reagent can be used as an antichlor.

Three series of experiments were carried out with the express purpose of obtaining information which can serve to answer these queries. In the first series of experiments 1/128 gram molecule of perborate (1.22 grams of a 10.3 per cent perborate solution) and 1/128 gram molecule of sodium hypochlorite, corresponding to 27 c.c. of a solution of 0.46 per cent oxygen, are added together on the form of an aqueous solution. The oxygen which is evolved by the reaction is caught in a vessel by water displacement. According to theory, 175 c.c. of oxygen gas should have been evolved, and the average results of two series of experiments were 178 and 175 c.c. All the perborate and all the sodium hypochloride were decomposed in both cases.

In the second series of experiments the same quantity of perborate was used as in the first series, but only half the theoretical amount of sodium hypochlorite was added—that is, 13.5 c.c. of solution. The result was that an average of 87.5 c.c. of oxygen were liberated. While all of the sodium hypochlorite was decomposed, analysis showed that half of the perborate remained behind.

In the third experiment, the same quantity of sodium hypochlorite was used as in the first experiment, but only one-half of the perborate—that is, 1/266 of a molecule. About 88 c.c. of oxygen were caught.

In the fourth series of experiments the rapidity of the decomposition or reaction was tested at various temperatures—namely, zero deg. Cent., 10 deg. Cent. and 40 deg. Cent. The results showed that the duration of the decomposition was five minutes at zero deg. Cent., two minutes at 10 deg. Cent. and the same at 40 deg. Cent.

The conclusions that are derived from these experiments are that the sodium perborate-sodium hypochlorite reaction is one that goes to completion provided enough of the reacting substances are present, and that the speed of the reaction reaches a maximum at a temperature of 10 deg. Cent. and is not accelerated when the temperature is raised even up to the point of decomposition of perborate, which is 45 deg. Cent. (Melliand's Textilberichte, 1927, pp. 73-74.)

Rapid Recognition of Spots and Injuries in Fabrics Due to Bleaching

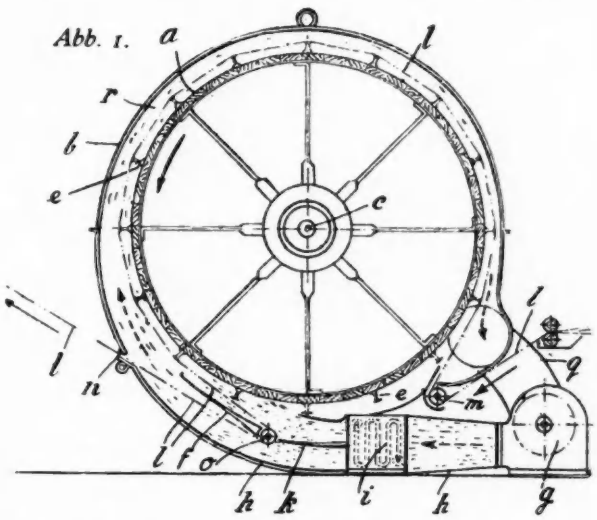
Rust spots are most frequently encountered of all the spots that are found after the bleaching process. These are easily recognized by the fact that when tested with hydrochloric acid and potassium ferrocyanide solution they turn blue. The reaction with potassium sulphocyanide is just as useful for this purpose, a red color being obtained. The spots can themselves be removed by treatment with 0.1 to 0.15 per cent solution of sodium hydrosulphite at a temperature of 60 deg. Cent.

The presence of copper can be detected by testing the spot with dilute nitric acid solution, the filtered solution then being mixed with ammonia. A blue color indicates the presence of copper. Spots which are due to the presence of lead salts are detected by testing with ammonium sulphide, the spot turning black if lead is present. Spots due to dextrin or starch, which often occur due to irregular heating, are detected by iodine solution. Lime spots are quickly and surely detected by dyeing with Alizarine S, which will be absorbed only by those places where lime is present, while the rest of the fabric is undyed. This test often prevents trouble in the dye bath.

Mineral oil spots are detected by their solubility in certain organic solvents, particularly carbon tetrachloride. This solvent can be advantageously used to remove them. Overbleached portions of the fabric, which have been attacked by the chlorine, are detected by the oxycellulose iodine-starch reaction. The detection of free chlorine in the fabric can be accomplished by using a solution of hexamethyltriaminophenylmethane which is acidified with hydrochloric acid, which turns a deep violet when chlorine is present. The overbleached spots are always rendered visible in the subsequent dyeing operation, due to the reason that they are more deeply dyed than the remainder of the fabric. (Textile Record, 1926, pp. 65ff, No. 517.)

Drying Sized Warp Yarns

The sized thread runs into a closed, unheated jacket provided with ribbed, perforated projections over a guide drum of large diameter, while the comparatively narrow ring-shaped space surrounding the drum is heated by the passage of a current of hot air. A side view of the apparatus is seen in Fig. 1. A space r is formed between the large drum a and the jacket b, and the thread passes through this space as indicated



at l. The inlet is below and to the right. The thread passes over the roller m, drum a, roller o, and then through the opening n and thence out of the apparatus.

The fan g produces a current of air, which enters through the pasage h. The heater is indicated at i and the separatory walls at k and f. There is a return passage q on the other side of the apparatus, through which the air is sucked back again into the fan.

The circulation of the air is therefore in countercurrent to the travel of the thread. The air current is first divided between an upper and a lower passage, and hence penetrates through the thread, with the result that it is dried thoroughly and at a high rate. (German Patent No. 428,302.)

Chemical Mechanism of Dyeing

In investigating the mechanism of the process of vat dyeing of cotton, it was determined in the first place that the affinity of the various vat dyestuffs, such as flavanthrene, Indigo, thioindigo and tetrabromoindigo for the cotton fiber, varies markedly and that the most essential condition for the obtaining of good dyeings is that the leuco compound possess a strong affinity for the fiber. It was further indicated that the leuco compound generally forms a firm combination with the fiber, only in the form of the free acid, for the sodium salt does not act in this manner.

The experiments were limited to the indanthrene dye-

stuffs and the apparatus used in them was constructed in such a manner that the entire vat process was carried out in the absence of air in an atmosphere of carbon dioxide or other suitable gas. It was thus possible to compare the reaction of the cellulose fiber with the leuco acid as well as with its alkali salts, conditions being maintained constant, and at the same time the behavior of the same could be observed under ordinary conditions.

It was found that a sample dyed with the leuco derivative of Indanthrene Blue in an atmosphere of carbon dioxide exhibited a very strong resistance when treated with a hot soap liquor at a temperature of 90 deg. Cent. The striking feature of this experiment was that the free leuco acid was not converted into the sodium salt in spite of the alkalinity of the solution. Then when the soaped and washed sample was oxidized in air, a very much more intense dyeing was obtained than ordinarily possible. The same observations were made in the cases of Indanthrene Orange and Indanthrene Golden Orange.

The course of the reaction was very well followed out in these cases, for the reason that dyeing of the leuco acids is quite different, namely, brown or yellowish red, than that of the salts, which is violet and fuchsin red. When the leuco compounds of these dyestuffs are treated in an atmosphere of carbon dioxide with a boiling soap solution, then the color of the leuco acids remain permanently unchanged. The process may be reversed for comparative purposes, and a leuco dyeing, made in the usual manner, can first be treated with dilute acid and then soaped, and finally developed. In this case deeper colors are obtained than when the acid treatment is omitted.

The explanation of this process must be found only in the fact that the free leuco acids possess a higher affinity for the cotton fiber than the salts. Corroboration of this assumption is found in the fact that the reduction of the vat dye preparatory to dyeing is carried out not in an acid but in a neutral gaseous atmosphere, and then is washed with a boiling solution of soap under the same conditions, that is in an atmosphere of nitrogen or illuminating gas. This results in the leuco compound being completely precipitated on the fiber, which is an indication of the fact that the acid possesses no affinity for the cellulose when the former is present in the form of an alkali salt.

For further details see Der Textilchemiker und Colorist, 1926, pp. 178-179.

TURIN'S EXPOSITION

The International Chemical Exposition will be held at Turin, Italy, in 1928. Chemical industries have been divided into sixteen groups as follows: Inorganic chemical products; organic compounds; hydrocarbons; metallurgy, electro-chemistry and electro-thermics; chemical material for defense and offense; mining industry and fuels; paints and varnishes; natural and artificial textile fibers; tanning and tanning extracts, glass and porcelain, pharmaceutical chemicals and chemicals for sanitary use, machinery and equipment for chemical industry, chemistry in agriculture, pure chemistry, photography, radiography, rubber, rosin and natural and artificial plastics and derivatives, state monopolies.

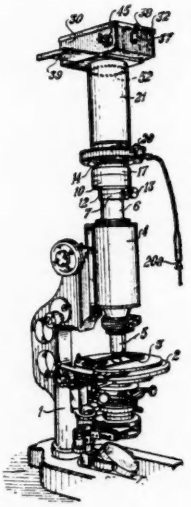
RECENT PATENTS

Photomicrographic Camera

(1,625,952; April 26, 1927)

F. Lucas, East Orange, N. J.

The combination with an image-forming device having an adjustable tube, of means for deriving the image formed in said image-forming device, and means



for clamping said image deriving means to the adjustable tube of said image-forming device, said clamping means providing for a clearance for different sizes of visual lenses and a set screw for securing said clamping means to said adjustable tube.

Manufacture of Vat Dyestuffs

(1,625,826; April 26, 1927)

Paul Schmidt, Biebrich-on-the-Rhine, Germany, assignor, by mesne assignments, to Grasselli Dyestuff Corporation, New York, N. Y., a corporation of Delaware.

As a new product the vat dyestuff substantially identical with the product obtained by an alkaline fusion of the methoxynaphthalene 1.8-dicarboxylic-acid-di-imide, which most probably is a mixture of isomeric dimethoxy perylene-tetracarboxylic-acid-di-imides, a black powder with a metallic luster forming with an alkaline hydrosulphite solution a blue vat, from which cotton and wool are dyed blue shades.

Manufacture of Artificial Silk and the Like from Viscose Solutions

(1,626,454; April 26, 1927)

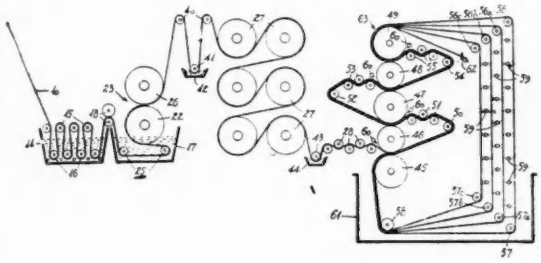
William Porter Draper, London, England.

In the manufacture of finer denier artificial filaments from viscose solutions, the extrusion of the solution from the spinning jet into an acid-salt precipitating bath containing not less than 4 per cent and not more than 10 per cent of a zinc salt and substantially 21 per cent of sodium sulphate.

Method of Treating Textiles

(1,626,438; April 26, 1927)

Frederick Benedict Voegeli, Easton, Pa.



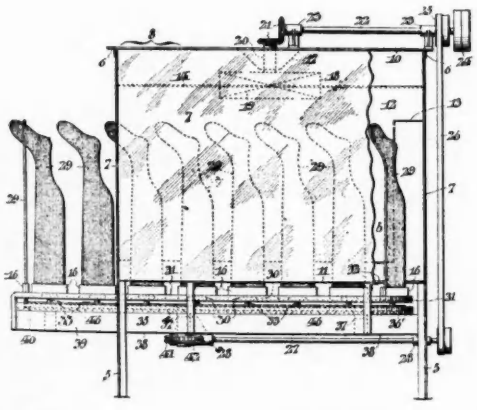
The steps in the method of mercerizing textile goods comprising subjecting the goods to hot caustic and cold caustic baths in succession and cooling the goods.

Drying Machine

(1,627,529; May 3, 1927)

Harry H. Wigglesworth, Philadelphia, Pa., assignor to the Philadelphia Drying Machinery Company, Philadelphia, Pa., a corporation of Pennsylvania.

A drying machine comprising an enclosure having apertured partitions and a connected diaphragm affording a vertical drying corridor, detached form carriers traversible edge-on over a zig-zag course through



said corridor in sequential alignment, and a horizontally traveling conveyor for progressing said carriers through the enclosure with an interval of exterior exposure for the purposes specified.

Dyestuffs Containing Chromium, and Process of Making the Same

(1,626,167; April 26, 1927)

Fritz Straub, Basel, Switzerland, assignor to the firm Society of Chemical Industry in Basle, Basel, Switzerland.

A process for the production of azo dyestuffs containing chromium by treating the ortho-hydroxy-azo dyestuffs obtained by coupling nitrated mononuclear ortho-hydroxy-diazo compounds with α-naphthylamine derivatives which combine in ortho-position to the amino group, with derivatives of trivalent chromium.

Art of Coloring Leather

(1,625,842; April 26, 1927)

Peter A. Blatz, Wilmington, Del.

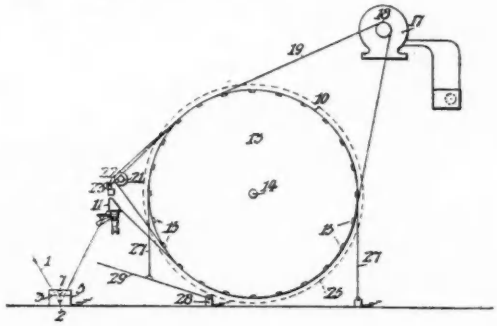
In the art of coloring leather, the step of fastening the skins together; portions of the skins being overlapped in an uneven or unsymmetrical condition, and then drumming such connected skins in a coloring solution.

Filament-Dyeing Apparatus

(1,627,059; May 3, 1927)

Samuel A. Neidich, Edgewater Park, N. J.

In filament-dyeing apparatus; the combination with a rotary drying reel; of means arranged to pass extruded viscose filaments singly axially through dye liquor during their traverse toward said reel from the



place of their extrusion and before they are initially dried, including a container for dye liquor; and a guide having an eye for a single filament, adapted to be moved to and from a position of submergence in the dye liquor in said container.

Process of and Apparatus for Treating Liquids with Purifying and Decolorizing Agents

(1,627,343; May 3, 1927)

Johan Nicolaas Adolf Sauer, Amsterdam, Netherlands.

A process for purifying a liquid containing an adsorbable impurity by means of a solid insoluble absorbent medium capable of being readily suspended in the liquid, which comprises agitating a bulk of the said

liquid while carrying said solid in suspension and continuously separating the said solid from the purified liquid, preliminarily mixing such separated solid with a further amount of liquid to be purified in such proportions as to form a readily flowable fluid mass and continuously feeding such fluid mass to the said bulk of liquid under agitation, while such continuous separation of said liquid and solid being effected by a filtration in which the liquid to be filtered is maintained under a hydrostatic pressure substantially higher than the filtered liquid, thereby producing a positive pressure difference to force liquid through the filter from the face side of said filter, and effecting a reversal of the pressure difference during the operation of separating the said solid matter from the filter surface.

Composition for Washing Clothes or Other Fabrics

(1,628,970; May 17, 1927)

Christian B. Hager, Marshalltown, Iowa.

A composition for washing clothes or other fabrics, consisting of fire clay, sodium chloride, chloride of lime, and ultramarine blue.

Process of Making Ligno-Tanning Material from Waste Sulphite Liquor

(1,629,448; May 17, 1927)

Viggo Drewsen, Brooklyn, N. Y., assignor to West Virginia Pulp & Paper Company, New York, N. Y., a corporation of Delaware.

The process of producing a tanning material, comprising cooking waste sulphite liquor with lime at a temperature of about 130 deg. Cent. until the ligno sulphonic components of the sulphite liquor are partly desulphurized and the sugary components of the sulphite liquor are converted into organic acids, with the formation of a complex precipitate, percolating carbon dioxide through the mass until it is neutralized, thereby precipitating calcium carbonate and calcium sulphite and redissolving various organic precipitated constituents, filtering to remove the precipitate, concentrating and treating the filtrate with an amount of sulphuric acid equivalent to its calcium content, thereby precipitating calcium sulphate and forming a soluble tanning material comprising ligno sulphonic acid in combination with organic acids.

A DYEHOUSE IN FOUR BOTTLES

An enterprising dyestuff firm in Los Angeles is advertising a home dyeing kit that, it is claimed, enables the housewife to dye a thousand shades on silk, satin, lingerie, hosiery, light woolens and other fancy fabrics. Four basic colors—pink, yellow, blue and violet—are put up in a set of four bottles, with full directions for their use.

"Prisma" Dye Extract, as it is called, is used like bluing, the shade depending on the amount of dye used to make the solution. The process of dyeing with these colors is clearly described in detail in a leaflet accompanying the set. The suggestion is even made that colors be tested before dyeing by means of a sample for shade and fastness to washing and ironing. A blending chart is included, based on the number of drops of dye necessary for various tints and shades. The four basic colors are mixed with one another in varying proportions to make still other fancy shades, and may even be dyed over each other for some combinations.

The Boston branch of the National Aniline & Chemical Company is now located at 27-28 Lewis Wharf. Both office and warehouse were moved to this address on June 20 for the purpose of securing better freight-handling facilities.

The rate for "Position Wanted" advertisements in this column is 2 cents a word—with a minimum of 50 cents per insertion. For all other types of advertisements—i. e., help wanted, machinery or supplies for sale—the rate is $5.00 per column inch or less per insertion.

SKEIN DYER

Wanted—Capable dyer on rayon skeins, experienced in direct dyeing, by a rayon and silk processing firm in the New York district. Textile school training will be an asset, but is not essential. Address Classified Box 405, American Dyestuff Reporter.

DYER'S ASSISTANT

German dyer, experienced on cotton, mercerized cotton and rayon, both skeins and piece goods, seeks position as assistant to dyer. Address Classified Box 406, American Dyestuff Reporter.

REPRESENTATIVE

Representative covering New York State and upper New Jersey to handle well-advertised line—Sulphonated Oils—Boil-Off Oils—Rayon Oils—and all specialties for the textile industry, on a commission basis. Must be well acquainted with trade and have good following. Address Classified Box 407, American Dyestuff Reporter.

DYE PLANT

Well-equipped dye plant for bleaching and dyeing; about 75 by 100; in New Durham, N. J.; on reasonable terms. Good opportunity for small dyer to start in business. For information apply to The Inflexible Company, 313 Eleventh Street, West New York, N. J.